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Effects of Pension Contribution on Household Saving and Consumption under Financial Indebtedness*

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This paper empirically analyzes the effects of national pension contribution on household saving and consumption across income quintiles under financial indebtedness. We use the system GMM estimation for dynamic panel analysis to investigate these effects with the Korean Labor & Income Panel Study (KLIPS) data. We find that the household pension crowds out household saving as the previous literature has found. This crowding-out effect, however, arises mainly from the less indebted households but not from the heavily indebted households. The pension benefit structure in Korea is known to have a positive wealth effect across all income quintiles such that pension increases households' consumption, but the heavily indebted households cannot increase their consumption as much as the less indebted households do, and/or even reduce it by tight financial constraints. The different effects of public pension across financial indebtedness have an important implication in a current economic environment, where household debt and credit have grown more rapidly than household income.

JEL Classification: H31, H55, E62
Keywords: national pension service, system GMM,
crowding-out effect, financial indebtedness

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1. INTRODUCTION

National Pension Service (NPS) as Social Security in Korea has implemented since 1988. It applies to all workers in Korea who are not registered in the other public pensions.[1] The number of new registers in NPS has grown constantly and is over 21 million as of 2014. It has a characteristic of a forced saving known to have redistributive effects across income groups and generations in Korea. Thus, national pension contribution is likely to change household saving and consumption.

Since Feldstein (1974) reported the crowding-out effect of Social Security wealth on private savings, many empirical studies have researched about the effect of public pension with different data. Feldstein (1974) used time series data for the investigation. It uses consumption function to find the crowding-out effect of Social Security on private saving based on a simple lifecycle model with an actuarially-fair Social Security system. It suggests Social Security reduces 30-50% of private saving in the US.

However, there was a problem in time series analyses in that the results of the analysis could differ from the time periods and econometric models. Feldstein and Pellechio (1979) uses cross-section data to solve the problem. It shows that the increase in Social Security wealth of one dollar reduces the non-pension wealth of 70 cents, and finds that there exists a crowding-out effect on the saving.

In other cross-section analysis, Kotlikoff (1979) in pay-as-you-go system uses the present value of the total amount of Social Security tax as an explanatory variable. Also, King and Dicks-Mireaux (1982) and Hubbard (1986) add private pension as a control variable. They find the effects of public and private pension on non-pension wealth respectively. Attanasio and Brugiavini (2003) uses difference-in-difference estimator to exploit the

[1] National Pension scheme (1988) is one of public pension schemes in Korea. There exist other public pension schemes such as Government Employees Pension (implemented in 1960), Military Personnel Pension (1963), Private School Teachers Pension (1975) and Specially Designated Post Office Employees Pension (1992). People who earn labor incomes are registered in one of them by their jobs but cannot be in more than one by law.

Italian pension reform of 1992. As a whole, they all show crowding-out effects of a public pension wealth on private saving. In addition, Diamond and Hausman (1984) uses panel data and shows that Social Security wealth crowds out non-pension wealth.

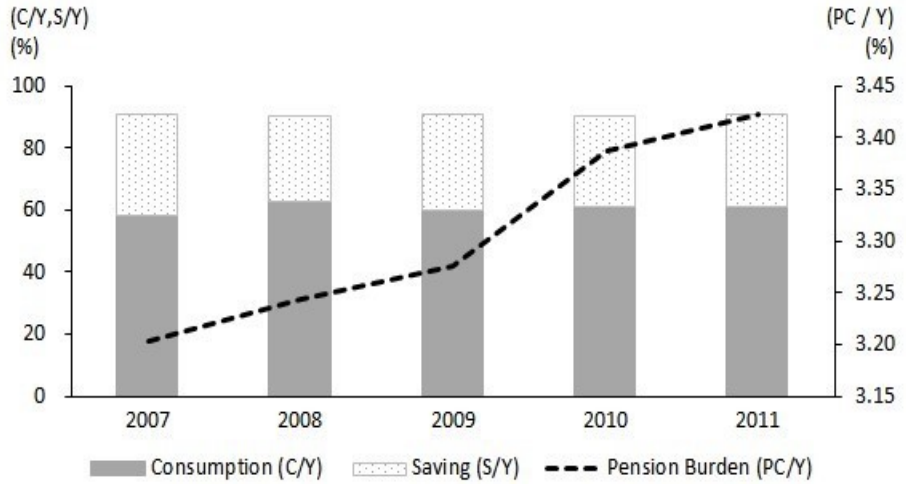
In Korea, Yun *et al*. (2008) with time-series data calculates National Pension wealth by the Accrued-to-date method. It finds that the pension wealth increases private consumption (0.1-0.13) and crowds out private saving, using Feldstein (1974) model. In cross-section analyses, both Kang and Lim (2005) by King and Dicks-Mireaux (1982) model and Kim (2007) with KLIPS data show the crowding-out effects of public pension wealth on private saving.

In panel analysis, Kim *et al*. (2008) with KLIPS data finds that the increase in National Pension wealth of 10% reduces household saving of 1%. Most of all, it shows the different effect of the pension wealth across the income groups. As a result, it finds that the crowding-out effects is bigger in the low-income groups than in the high-income ones. Cha and Kim (2013) with KLIPS data analyzes the effect of National Pension expenditure on household saving by income groups and by ages of head of household (HOH). It exploits pension expenditure as an independent variable and shows the bigger crowding-out effect on household saving in low income groups and in older groups under age 55.

Figure 1 shows the household expenditure by years, in which the rate of pension burden (=pension contribution/total income) has increased from 3.20 to 3.42% during five years, instead household saving has reduced by 3 percentage point (pp) and consumption increased by 3 pp. Many empirical studies including Korean pension program have analyzed the effect of public pension on private saving and found that the pension wealth crowds out a part of private saving. While many papers focus on the effects on saving and have shown the similar results, only few papers have researched on the effects on household consumption and concluded in different directions.

Analyzing the effect of public pension on the consumption is more complicated than on the saving, since the consumption is not simply related to

Figure 1 Household Expenditure by Years



Source: Korean Labor & Income Panel Study (KLIPS).

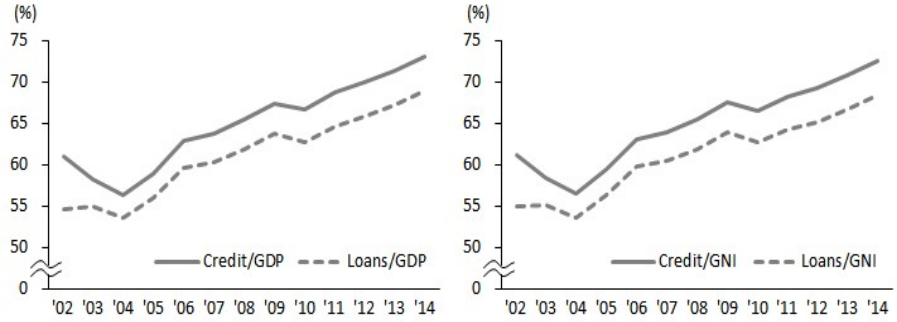
the amount of the pension expenditure. Instead, the total amount of the pension wealth affects the consumption. To analyze the effect of the pension on the consumption, we need to know the lifetime pension wealth of all households. Although there is a method of Accrued-to-date wealth[2] for the calculation, it is still sophisticated to calculate it in person.

In addition, the consumption can differ across households' financial states as well as the amount of income that households earn. For example, when there is a redistributive component in the pension benefit scheme, low-income households may expect to have more benefits than their contributions so that they are likely to increase their consumption more than high-income households. On the other hand, households cannot increase their consumption when they cannot borrow more money enough to consume, which is the financial constraint coming from debt.

Figure 2 shows the size of credits and loans to households relative to GDP (gross domestic product) and GNI (gross national income) in Korea. It suggests that the financial indebtedness of households in Korea has grown

[2] Accrued-to-date wealth is internationally used in World Bank and in Korea to calculate Social Security wealth.

Figure 2 Household Credit and Loans to GDP (GNI)



Source: Bank of Korea.

faster than the total products or total income does. A simple lifecycle model suggests that the household optimal decision on consumption and saving depends on a financial state (indebtedness). Up to our best knowledge, no one has ever empirically investigated the effects of pension payment on household expenditures (consumption and saving) by households' financial states. For these reasons, this paper based on a lifecycle model empirically analyzes the different effects of National Pension on household saving and consumption by income groups, taking into account the financial state of each household by using criteria with Loan-to-value (LTV) and Debt-to-income (DTI) ratios.

2. BASIC CHARACTERISTICS OF NATIONAL PENSION PROGRAM IN KOREA

National Pension Service in Korea was introduced to enable people to smooth the consumption sequence in old age by providing pension benefit in the old age while the contribution is collected in a working age. The Korean pension program is a partially-fully funded system in that the benefits do not just depends on beneficiaries' past contributions but also on the average income of the related insured persons over the last 3 years. We can

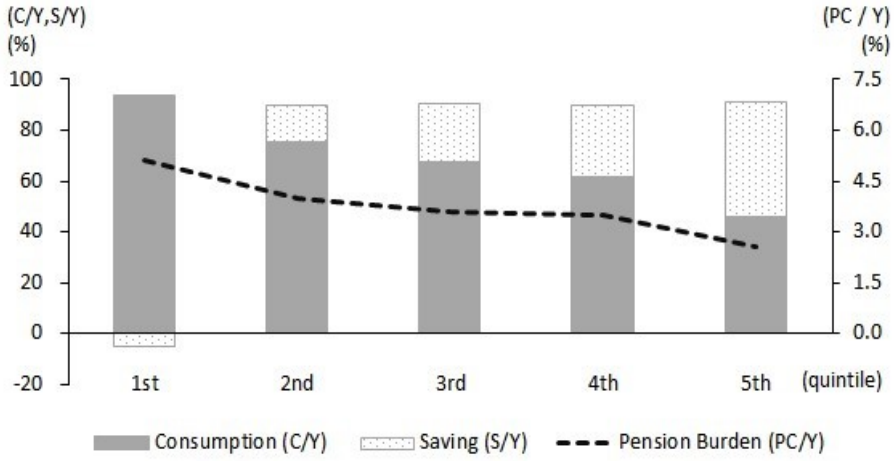
summarize some basic characteristics of National Pension Program in Korea as follows:

First, National Pension requires the contribution as an insurance fee during working periods. Thus, all the beneficiaries must pay their contributions before starting to receive their benefits for at least ten years and stop paying it and start to receive the benefit at age 60. The contribution is the amount of pension payment that all beneficiaries must pay every month at least 10 years before the beneficiaries are qualified to take the pension benefits in the old age. The contribution amount is equal to 9%[3] of standard income which is a monthly labor income of each register in general. They should report their incomes to National Health Insurance Service (NHIS) at the beginning of every year. Then, the income reported as the standard income is fixed during that year for the calculation of the contribution. One of distinct features of the contribution is that there exist a minimum and a maximum income levels in standard income. The minimum level of standard income as of July 2014 is 260,000 won and the maximum is 4,080,000 won. Low-income worker whose standard income is lower than the minimum level still has to pay 9% of the minimum level (260,000 won) for their contribution. The same logic applies to the high-income worker such that high-income laborers who gain more than the maximum level do not need to pay more than the 9% of the maximum level (4,080,000 won). Therefore, the pension burden, defined as a ratio of the contribution to standard income on low-income earners can be higher than high-income ones. Due to the facts that there exist the minimum and the maximum levels of standard income and the share of labor income to the total income of household could be shrunken as the total income of household increases, a pension burden (a ratio of pension payment to total income) as a quasi-tax rate would be regressive as shown in figure 3.

Secondly, the benefit of National Pension is determined by both earnings-related and redistributive components together. The earnings-related component is the average amount of the standard income of an insured person

[3] However, if an employer shares 4.5% of workers' contributions, then the workers in the firm will pay the rest 4.5% of each contribution.

Figure 3 Household Expenditure by Income Quintiles



Source: Korean Labor & Income Panel Study (KLIPS).

during his/her insured period. In addition, the redistributive components contain the average of the price-indexed average monthly income for the 3 years prior to the commencement of pension benefit.

It is important to note that the amount of the insured's contribution is not a single determinant of the one's pension benefit. As the earnings-related and redistributive components are being used to calculate the exact amount of the benefit, the lifetime pension wealth, which is the present value of the flow of pension benefit, has been frequently used for the analysis of public pension. However, the calculation of lifetime pension wealth is very complex and there exists no unified method to compute it in the literature. Particularly, forecasting future stream of household incomes and its life expectancy is still difficult. Thus, the amount of contribution of National Pension can be considered as the determinant of the benefit function based on a life-cycle model. However, there still exists an endogeneity problem since the lifetime pension wealth is not used for the analysis (Kim *et al*., 2008). For this reason, we use dynamic panel analysis with system GMM estimators to solve the endogeneity problem and to estimate the effects of pension payment on household expenditure.

Table 1 Internal Rate of Return on Pension in Korea

Birth Cohort	Low-income	Average-income	High-income
1970	2.95	1.99	1.67
1975	2.77	1.89	1.59
1980	2.66	1.81	1.53

Source: Kim *et al*. (2008).

The internal rate of return from the public pension in Korea is known to be higher than the market interest rate, while the fully-funded pension program would have the same rates.[4] The higher internal rate of return of the national pension implies that pension contribution indeed increases the lifetime wealth through the vehicle of pension program and possibly raises the household consumption.

Table 1 from Kim *et al*. (2008) shows that the internal rate of return on pension in Korea is much higher than the market interest rate and particularly, the return on pension is higher in a low-income household due to the redistributive components in pension benefit scheme. We can also see that the return has been reduced for those who was born recently since the government has adjusted the benefit and replacement rate accordingly.

3. SIMPLE LIFECYCLE MODEL OF HOUSEHOLD

Let us try to draw some intuitions on the effect of public pension payment on household's saving and consumption from a simple 3-period lifecycle model. We assume that the household lives for three periods $(t = 1, 2, 3)$. In their first and second periods of life, household earns labor income (Y_t), pay a certain share (τ) of income for the public pension, and decide how much to consume (C_t) and save (S_t). In the third period $(t = 3)$, household lives with pension benefit and income from the earlier saving $((1+r)S_2)$.

Each time, the household budget constraints can be written as follows:

[4] See the Kim *et al*. (2008) and Shin (2012).

$$C_1 + S_1 = (1-\tau)Y_1,$$
$$C_2 + S_2 = (1-\tau)Y_2 + (1+r)S_1,$$
$$C_3 = (1+g)^2 \tau Y_1 + (1+g)\tau Y_2 + (1+r)S_2,$$

where τ is a pension payment rate, g is an internal rate of return from pension payment, r is a market interest rate. From the per-period budget constraints, we can derive the lifetime budget constraint:

$$C_1 + \frac{C_2}{1+r} + \frac{C_2}{(1+r)^2} = Y_1 + \frac{Y_2}{1+r} + \left[\left(\frac{1+g}{1+r}\right)^2 - 1\right]\tau Y_1 + \left[\left(\frac{1+g}{1+r}\right) - 1\right]\frac{\tau Y_2}{1+r}.$$

Subject to the lifetime budget constraint, household maximizes the lifetime utility, $U(C_1) + \beta U(C_2) + \beta^2 U(C_3)$, where β is a time discounter, and finds the solutions for the optimal consumptions, C_1^*, C_2^*, C_3^* for the three periods:

$$C_1^* = \frac{1}{1+\beta+\beta^2} \cdot WE,$$
$$C_2^* = \frac{\beta(1+r)}{1+\beta+\beta^2} \cdot WE,$$
$$C_3^* = \frac{\beta^2(1+r)^2}{1+\beta+\beta^2} \cdot WE,$$

where WE is a lifetime discounted income,

$$WE \equiv Y_1 + \frac{Y_2}{1+r} + \left[\left(\frac{1+g}{1+r}\right)^2 - 1\right]\tau Y_1 + \left[\left(\frac{1+g}{1+r}\right) - 1\right]\frac{\tau Y_2}{1+r}.$$

Let us first consider the case where the market interest rate r equals to the internal rate of return from pension payment g. Then household lifetime wealth, $WE = Y_1 + Y_2/(1+r)$ becomes independent of the pension payment. The pension payment has no impact on the consumption but crowds out the household savings.[5] In the other case where the market interest rate r is

[5] See the Feldstein (2002) for details.

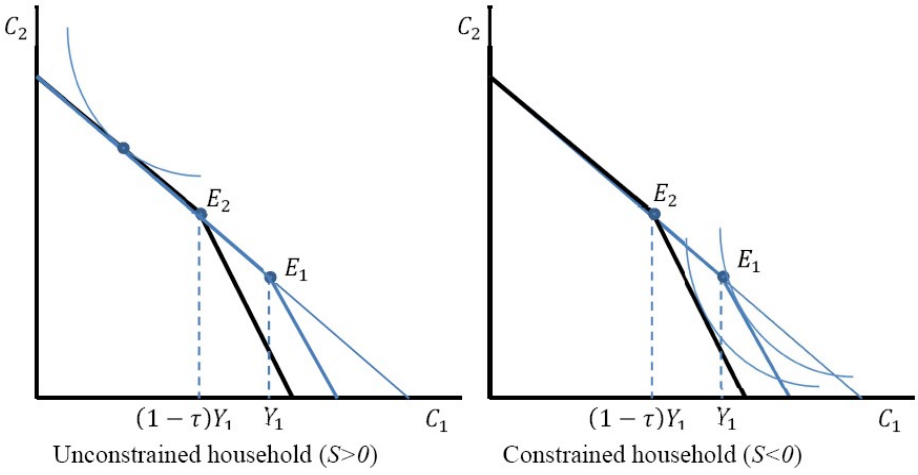
different from the internal rate of return from pension payment g, assume the return from the pension is higher than the market interest rate, $g > r$. Then the pension payment increases the household lifetime wealth,

$$WE_{g>r} = Y_1 + \frac{Y_2}{1+r} + \left[\left(\frac{1+g}{1+r}\right)^2 - 1\right]\tau Y_1 + \left[\left(\frac{1+g}{1+r}\right) - 1\right]\frac{\tau Y_2}{1+r} > WE$$

and the pension payment would increase the consumption and crowds out the saving.

Let us suppose that household holds debt instead and faces the higher borrowing rate than a lending rate. We can easily see that the effects of the pension payment on household expenditure depend on the financial constraint or debt constraint. Figure 4 shows the effects of the pension in a lifecycle choice with the financial friction. Note that the intertemporal budget constraint is kinked when the borrowing rate is different from the lending rate to the household. The point E_1 is the intertemporal income point without the pension payment, τY_1 and the point E_2 is the disposable income point after paying the pension payment. As in figure 4, the pension payment does not change the consumption choices of the unconstrained household, while it reduces the consumption level of the constrained household and further would

Figure 4 Optimal Intertemporal Choices



reduce the welfare of the constrained.

4. EMPIRICAL ANALYSIS

4.1. Data

In this paper, we use the panel data from the 10th to the 15th Korean Labor & Income Panel Study (KLIPS) for year 2006 to 2011.[6] The data is set as an unbalanced panel dataset to cover as many observations as possible as in Kim *et al*. (2008). All the nominal variables are deflated to be real-valued by CPI for Living Necessaries (2010=100).[7] Also, household income as a disposable income does not contain all taxes and social insurance contribution as a quasi-tax. For our analysis, we include the households who have answered to all the questions, have positive income and consumption and are registered only in National Pension and pay the contributions.

Table 2 is the summary statistics of the data by income quintiles. Household expenditures including consumption, saving and pension contribution in levels increase as household income rises.

Also, the variables for the household characteristics including house ownership, age of head of household, education level, number of workers are positively related with the income. In addition, the value of real estate, household debt and debt repayment increase with rise in the income as well.

We use two variables, Loan-to-value (LTV) ratio and Debt-to-income (DTI) ratio in order to measure the financial indebtedness of household. LTV is the ratio of a loan to the value of an asset purchased and DTI is the share of a household's yearly gross income that goes toward paying debts. LTV ratio[8]

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[6] KLIPS data known as well-organized public data in Korea are frequently used for a wide range of researches in social science. Until the 10th survey, National Pension is combined with social insurance contribution in the same account, but since 11th the account has divided them into each account so that it is possible to use only National Pension for the analysis in the data.

[7] Data source from KOSIS.

[8] Loan-to-value ratio = Household Debt / Value of household's Asset.

Table 2 Summary Statistics by Income Quintiles

(units: thousands)

	Income Quintiles				
	1st	2nd	3rd	4th	5th
Total Income (Y)	17,964	30,313	40,394	53,512	98,998
Labor Income (YL)	16,952	28,937	38,525	50,763	83,647
Consumption (C)	16,759	22,737	27,257	33,054	45,564
Saving (S)	–965	4,389	9,284	15,026	44,647
- deposit	–1,093	4,173	8,961	14,601	43,784
- private pension	7	13	21	43	125
- others	122	206	301	387	743
Pension Contribution	918	1,201	1,452	1,855	2,545
House Ownership	0.44	0.55	0.64	0.68	0.73
Age of HOH	45.17	45.72	46.59	47.24	48.11
Sex of HOH	0.73	0.86	0.89	0.93	0.95
Education Level of HOH	3.15	3.33	3.43	3.70	4.02
Number of Members	2.55	3.16	3.51	3.67	3.87
Number of Workers	1.20	1.44	1.65	1.78	1.88
Number of Children Under 18	0.32	0.46	0.53	0.55	0.55
Real Estate	17,770	29,911	41,647	86,932	175,627
Debts	17,747	28,138	36,354	50,656	98,844
Debt Repayment	1,210	1,928	2,349	3,477	6,056

Notes: House ownership equals 1 if a household owns their house. Otherwise, it is 0. Sex of HOH equals 1 if a head of household is male. Otherwise, it is 0. Education level equals 0 for under elementary school, 1 for elementary school, 2 for middle school, 3 for high school, 4 for community college, 5 for undergraduate, 6 for master degree and 7 for doctorate degree.

Source: Korean Labor & Income Panel Study (KLIPS).

Table 3 Average Values of LTV and DTI Ratios by Income Quintiles

(unit: %)

	Income Quintiles				
	1st	2nd	3rd	4th	5th
LTV	99.90	94.10	87.30	58.30	56.30
DTI	6.70	6.40	5.80	6.50	6.10

Source: Authors' calculation from KLIPS.

decreases as the income group goes up and DTI ratio[9)] is the biggest in the lowest-income group and the smallest in the 3rd quintile.

To divide households under our data set into the financially-constrained and the financially-unconstrained, we utilize the LTV ratio and DTI ratio as

9) Debt-to-Income ratio = Interest Payment for Debt / Household Income.

Table 4 Summary Statistics by Years

	Years				
	2007	2008	2009	2010	2011
Total Income (Y)	50,574	47,365	48,277	48,258	47,051
Labor Income (YL)	45,129	42,872	43,551	44,210	43,234
Consumption (C)	29,208	29,553	28,691	29,306	28,706
Saving (S)	16,385	13,074	15,037	14,132	13,959
- deposit	15,915	12,683	14,659	13,749	13,604
- private pension	38	38	41	47	44
- others	433	353	337	336	311
Pension Contribution	1,610	1,531	1,579	1,634	7
House Ownership	0.63	0.62	0.6	0.61	122
Age of HOH	46.39	46.57	46.31	46.64	46.89
Sex of HOH	0.89	0.88	0.88	0.86	0.85
Education Level of HOH	3.41	3.46	3.54	3.6	3.62
Number of Members	3.45	3.38	3.33	3.33	3.28
Number of Workers	1.61	1.61	1.58	1.58	1.58
Number of Children Under 18	0.50	0.49	0.49	0.48	0.44
Real Estate	76,971	76,971	82,668	67,404	57,297
Debts	49,917	42,764	47,707	46,582	45,080
Debt Repayment	3,043	3,032	2,885	3,186	2,883

Notes: House ownership equals 1 if a household owns their house. Otherwise, it is 0. Sex of HOH equals 1 if a head of household is male. Otherwise, it is 0. Education level equals 0 for under elementary school, 1 for elementary school, 2 for middle school, 3 for high school, 4 for community college, 5 for undergraduate, 6 for master degree and 7 for doctorate degree.
Source: Korean Labor & Income Panel Study (KLIPS).

criteria, which separate two groups. Higher LTV and DTI both imply that household holds more debts in total.

Table 4 shows summary statistics by years. Household expenditure decreases by years. But as we saw in figure 1 in the introduction, consumption ratio and pension burden ratio increase, while saving rate decreases during the five years.

Household debt and debt repayment on table 5 are reduced from 2007 to 2009 but drastically increase after that year, whereas DTI ratio increases 0.1% from 2007 to 2011.

Table 5 LTV and DTI Ratios by Years

(unit: %)

	Years				
	2007	2008	2009	2010	2011
LTV	64.90	61.10	57.70	69.10	78.70
DTI	6.00	6.40	6.00	6.60	6.10

Source: Authors' calculation.

4.2. Econometric Analysis

This section studies the different effects of household pension burden across income quintiles and then estimates how the effects of pension payment across income quintiles vary across financial indebtedness of households.

Households in Korean Labor & Income Panel Study (KLIPS) are randomly drawn sample observations. We can first consider a population-averaged panel-data model by using GEE model (Beck and Katz, 1995) as a pooled estimation. We select Gaussian option assuming the normal distribution of u_i and AR(1) option since there exists a significant AR(1) correlation between consecutive time-variant error terms.

We also test both random effect model and fixed effect model in panel regression with AR(1) option. It may be desirable to use a random effect panel regression model, which assumes that the error term u_i in the time-invariant household characteristics is a random variable following a probability density function. But we find that the fixed-effect model is more appropriate than the random effect model after Hausman test. Furthermore, *F*-test implies that fixed-effect model is preferred to pooled analysis since the null hypothesis that the error term in the household characteristics in each panel group is 0 is rejected. We still suspect that there exists an endogeneity problem in fixed effect model since the correlation between explanatory variables and the error term u_i are over 0.5. It implies that the fixed effect model does not overcome the endogeneity problems coming from the fact that we do not use the lifetime pension wealth as an explanatory variable.

In order to overcome the endogeneity problem, we use the a system GMM

model with robust option, which uses lagged level and difference variables of the dependent variables as instrument variables as in Arellano and Bover (1995) and Blundell and Bond (1998). We conduct Sargan test[10] and Hansen test[11] to make sure we can use the system GMM. It must be the case for us to use the system GMM that the error term $(e_{it} = \theta_t + \varepsilon_{it})$ has AR(1) but not AR(2) and then Sargan test should reject the null but Hansen test should not. We find that there exists a significant AR(1) but not AR(2) in the error term (e_{it}) and Sargan test and Hansen test also confirm that system GMM is appropriate.

4.2.1. Effects of pension payment across income quintiles

We use dynamic panel models to use a lagged dependent variable (Y_{it}) as one of control variables. Since there exists AR(1) but not AR(2) in error terms, we adopt system GMM estimators in order to overcome the endogeneity problem which may occur by using pension burden (PB) as an independent variable instead of individual's pension wealth.

$$Y_{it} = \omega Y_{it-1} + \beta X_{it} + \left[\delta + \sum_{j=2}^{5} \gamma_j D_{it}^j\right] PB_{it} + \left[\alpha + \sum_{j=2}^{5} \rho_j D_{it}^j\right] + \sum_{t=1}^{4} \mu_t D_t + u_i + \theta_t + \varepsilon_{it}, \quad (1)$$

where Y_{it}: dependent variable, X_{it}: household characteristics, PB_{it}: effective pension burden, D_{it}^j: j-th income-group dummies and D_t: year dummies.

As a dependent variable Y_{it}, we use saving rate (S/Y) and consumption rate (C/Y) to estimate the effects of pension payments on saving and consumption rates respectively. Also, there are other variables to control household characteristics and year dummies to control the time characteristics as well. Dummy variable D_{it}^j indicates the income quintiles

[10] The null hypothesis of Sargan test is: Not robust, but not weakened by many instruments.
[11] The null hypothesis of Hansen test is: Robust, but can be weakened by many instruments.

($j = 2, 3, 4, 5$) which household belongs to. The coefficient δ measures the effect of PB_{it} in the 1st quintile (base group) and γ_j measures a marginal difference in the *j*-th quintile from the base group. A constant term α shows the level of the dependent variable in the 1st quintile and ρ_j as level difference measures a marginal difference between 1st and *j*-th income group.

1) Effect on household saving rate

A result from the system GMM estimation in table 6 shows that pension burden (PB) crowds out (reduces) household saving as a whole. The crowding-out effect is the biggest in the 1st quintile (lowest income group) in which the increase in PB of 1% reduces the saving rate of 21%. The effect is the smallest in the 2nd income quintile and the marginal difference between the 1st and the 2nd is 19.37 so that the increase in PB of 1% reduces the saving rate of 2.1% in the 2nd group. Also, the marginal differences of the effect of PB decrease from the 2nd to the 5th income quintile.

In addition, the number of family members has a negative relation with household saving rate. When one more person is involved in a family the saving rate decreases at 10.3%.

2) Effect on household consumption rate

Table 7 is a result of the estimation on household consumption rate. First, when the education level of head of household increases by one level, the consumption rate grows by 7.9%. Also, when households own their house and have one more working member, the consumption rate increases by 9.2 and 11.5% respectively.

The result shows that PB increases household consumption rate as a whole. The results of system GMM suggests that the consumption rate increases the most in the 1st quintile and the marginal difference between the 1st and *j*-th group gradually decreases from the 2nd to the 5th group. As in the life-cycle model, with higher rate of return from the pension than market interest rate, the consumption increases as the pension contribution rises and the saving

Table 6 The Effect of Pension Burden on Household Saving Rate

Dependent Variables		Saving Rate		
		GEE(AR1)	FE(AR1)	System GMM
Saving Rate (-1)	ω			–0.00581 (0.0397)
LTV	β_1	–0.00311** (0.001)	–0.00203 (0.001)	0.00229 (0.004)
Age of HOH	β_2	–0.0292*** (0.011)	–0.174*** (0.054)	–0.104 (0.097)
(Age of HOH)^2	β_3	0.000268** (0.000)	0.00145*** (0.000)	0.0012 (0.001)
Sex of HOH	β_4	–0.0716* (0.042)	0.275 (0.174)	–0.0345 (0.152)
Education Level	β_5	–0.0280*** (0.009)	–0.146 (0.113)	0.0337 (0.072)
House Ownership	β_6	–0.0344 (0.022)	0.0712 * (0.040)	0.0554 (0.099)
Number of Members	β_7	–0.0730*** (0.013)	–0.00282 (0.035)	–0.103** (0.044)
Number of Workers	β_8	0.0235 (0.015)	0.0512** (0.024)	0.042 (0.035)
Number of Children 18-	β_9	–0.0883*** (0.022)	–0.0806 (0.050)	0.0643 (0.150)
Pension Burden by Income Quintiles	δ	–16.56*** (1.738)	–22.66*** (0.811)	–21.47*** (2.271)
	γ_2	12.03*** (2.315)	19.90*** (1.428)	19.37*** (2.838)
	γ_3	13.48*** (1.944)	19.91*** (1.413)	15.27*** (2.997)
	γ_4	13.48*** (1.905)	18.95*** (1.341)	11.91** (5.636)
	γ_5	11.88*** (2.266)	18.85*** (1.231)	17.36*** (2.767)
Level of Saving Rate by Income Quintiles	α	1.695*** (0.283)	–0.232** (0.117)	2.911* (1.711)
	ρ_2	–0.282*** (0.108)	–0.653*** (0.086)	–0.617*** (0.179)
	ρ_3	–0.170* (0.103)	–0.417*** (0.084)	–0.162 (0.223)
	ρ_4	–0.0885 (0.092)	–0.255*** (0.082)	–0.131 (0.205)
	ρ_5	0.115 (0.099)	–0.0846 (0.081)	–0.00261 (0.187)
Number of HH (Obs)		613 (1,990)	895 (1,876)	1,090 (2,205)

Notes: 1) Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. 2) Sagan Test (0.000) and Hansen Test (0.740).

Table 7 The Effect of Pension Burden on Household Consumption Rate

Dependent Variables		Consumption Rate		
		GEE(AR1)	FE(AR1)	System GMM
Saving Rate (-1)	ω			0.0325 (0.0475)
LTV	β_1	–0.000665 (0.000609)	0.000194 (0.000559)	–0.000814 (0.00105)
Age of HOH	β_2	–0.000224** (0.0000903)	–0.000808*** (0.00017)	5.58E–05 (0.000108)
(Age of HOH)^2	β_3	0.0251*** (0.00901)	0.0970*** (0.0196)	–0.00321 (0.0104)
Sex of HOH	β_4	0.0680** (0.0339)	–0.0953 (0.0874)	–0.012 (0.0406)
Education Level	β_5	0.0195** (0.00768)	0.0324 (0.0544)	0.0792*** (0.021)
House Ownership	β_6	0.0191 (0.0183)	–0.0640*** (0.0222)	0.0922** (0.0403)
Number of Members	β_7	0.0763*** (0.0106)	0.016 (0.021)	0.115*** (0.0197)
Number of Workers	β_8	–0.0373*** (0.0128)	–0.0303** (0.0149)	0.0429 (0.0283)
Number of Children 18-	β_9	0.0699*** (0.0195)	0.0182 (0.0301)	0.0291 (0.026)
Pension Burden by Income Quintiles	δ	15.01*** (1.44)	16.36*** (1.727)	15.39*** (2.93)
	γ_2	–11.84*** (1.93)	–14.19*** (1.885)	–14.17*** (3.404)
	γ_3	–13.79*** (1.629)	–15.19*** (1.909)	–13.76*** (3.16)
	γ_4	–13.72*** (1.561)	–15.01*** (1.871)	–12.63*** (3.151)
	γ_5	–11.36*** (1.986)	–12.79*** (2.136)	–11.77*** (3.509)
Level of Saving Rate by Income Quintiles	α	–0.656*** (0.233)	–2.422*** (0.74)	–0.201 (0.282)
	ρ_2	0.317*** (0.0894)	0.447*** (0.113)	0.253 (0.268)
	ρ_3	0.243*** (0.0839)	0.322*** (0.121)	–0.00862 (0.274)
	ρ_4	0.152** (0.0757)	0.172 (0.116)	–0.18 (0.282)
	ρ_5	–0.0655 (0.0825)	–0.0467 (0.116)	–0.367 (0.284)
Number of HH (Obs)		613 (1,990)	895 (1,876)	1,090 (2,205)

Notes: 1) Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. 2) Sagan Test (0.000) and Hansen Test (0.898).

Table 8 The Effect of PB on Saving and Consumption by Income Quintiles

LTV 50 & DTI 25	Quintile		Saving Rate	Consumption Rate
Pension Burden (PB) by Income Groups	1st	δ	–21.47***	15.39***
	2nd	$\delta + \gamma_2$	–2.10***	1.22***
	3rd	$\delta + \gamma_3$	–6.290***	1.63***
	4th	$\delta + \gamma_4$	–9.56***	2.76***
	5th	$\delta + \gamma_5$	–4.11***	3.62***

Note: ***p<0.01, ** p<0.05, * p<0.1.

reduces more than the amount of the contribution. Table 7 above shows the effect of pension burden (PB) by income quintiles, in which PB crowds out saving rates and raises consumption rates across the groups.

In table 8, the increase in PB of 1% reduces saving rates of at least 2% and raises consumption rates more than 1% in an income quintile. Thus, consistent with the life-cycle theory and Kim *et al*. (2008), the results conclude public pension in Korea has a positive wealth effect on consumption across income groups and crowds out household savings.

4.2.2. Effects across financial indebtedness and income quintiles

Although National Pension program in Korea has a positive wealth effect on an average household as a whole, the impact of the pension can differ across household's financial indebtedness according to the life-cycle model, in which when households are heavily-indebted and have borrowing limits, then the positive effect can disappear and even become negative. This subsection investigates the impact of pension payment between financially-constrained and unconstrained household across income groups.

Table 9 shows the proportion of the financially constrained household in our criteria. It shows that the share of the households with their LTV higher than 30% and DTI higher than 25% takes 5.35%, and that with LTV>50% and DTI> 25% takes 4.9%. The higher the values for LTV and DIT criteria, the more heavily indebted the households are.

Table 9 Proportion of the Household Indebtedness

(units: ratio (%) and number of observations in parenthesis)

Criteria	DTI>25% and LTV>30%	DTI>25% and LTV>50%	DTI>25% and LTV>70%
Heavily Indebted Households	5.35 (652)	4.94 (602)	4.66 (568)
Less Indebted Households	94.65 (11,530)	95.06 (11,580)	95.34 (11,614)

$$Y_{it} = \omega Y_{it-1} + \beta X_{it} + \left[\delta + \sum_{j=2}^{5} \gamma_j D_{it}^j + \left[\sigma + \sum_{j=2}^{5} \varphi_j D_{it}^j \right] C_{it} \right] PB_{it} + \left[\alpha + \sum_{j=2}^{5} \rho_j D_{it}^j + \left[\lambda + \sum_{j=2}^{5} \eta_j D_{it}^j \right] C_{it} \right] + \sum_{t=1}^{4} \mu D_t + u_i + \theta_t + \varepsilon_{it}, \quad (2)$$

where Y_{it} : dependent variable, X_{it} : household characteristics, PB_{it} : effective pension burden ratio, C_{it} : dummy for the financially-constrained, D_{it}^j : j-th income group dummies and D_t : year dummies.

Compared to equation (1), we add an estimator C_{it} as a dummy for the financially-constrained households into the previous model. The coefficients σ, φ_j, λ and η_j related to the new estimator are to be estimated. The coefficient σ indicates the marginal difference between unconstrained and constrained households in 1st group. And φ_j is the marginal difference between 1st and *j*-th group in the constrained households. The coefficient λ and η_j as level dummies can be interpreted in the same way.

Instead, the coefficient δ means the effect of PB of the unconstrained households in 1st group and γ_j does marginal difference between 1st and *j*-th group in the unconstrained. The coefficient σ and φ_j as level dummies for the unconstrained can be interpreted in the same way.

1) Effect on household saving rate

Table 10 shows the effect of pension burden on household saving rate by the heavily- and less-indebted households within each income group. The criterion of household indebtedness is DTI of 25% and LTV of 50%. Thus, households having DTI over 25% with LTV over 50% are considered to be

Table 10 The Effect of Pension Burden on Household Saving Rate

Dependent Variables		Consumption Rate		
		GEE(AR1)	FE(AR1)	System GMM
Pension Burden of the Less Indebted by Income Quintiles	δ	–15.44*** (1.143)	–19.49*** (0.816)	–23.10*** (2.678)
	γ_2	10.66*** (1.942)	16.2*** (1.354)	14.66*** (4.641)
	γ_3	12.19*** (1.349)	15.73*** (1.499)	13.24*** (3.157)
	γ_4	12.55*** (1.340)	15.7*** (1.289)	10.55** (4.782)
	γ_5	10.74*** (1.829)	15.98*** (1.170)	21.94*** (5.113)
Pension Burden of the Heavily Indebted by Income Quintiles	σ	–15.75 (13.070)	–12.03*** (1.811)	–11.17 (7.029)
	φ_2	17.61 (13.510)	13.69*** (4.975)	–27.41 (40.490)
	φ_3	19.87 (13.120)	17.76*** (3.057)	11.54 (10.940)
	φ_4	15.58 (13.290)	14.1*** (3.976)	18.7 (14.020)
	φ_5	20.17 (14.660)	–2.93 (5.348)	–4.184 (10.330)
Number of HH (Obs)		613 (1,990)	895 (1,876)	1,090 (2,205)

Notes: 1) Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. 2) The criterion of the constrained household is DTI > 25% with LTV > 50%. 3) Sagan Test (0.000) and Hansen Test (0.501).

heavily-indebted. Table 10 only reports the relevant estimates and the estimates on the household characteristics are omitted.

In the result of the system GMM estimation, the saving rates in the less-indebted households are crowded out across all income groups but it is not the case in the heavily-indebted households. Since the heavily-indebted households can be already financially-constrained and they are more likely to be a borrower rather than a saver. If this intuition is taken into our consideration, as their pension burden increases, they are already not a saver and the pension payment does not crowd out saving rates of the heavily-indebted households.

To be more specific, table 11 shows the effect of pension burden on household saving rates as DTI ratio changes with a fixed LTV ratio using system GMM. As we change the criterion of DTI ratios and the criterion of

DTI increases, the set of heavily-indebted households are more heavily indebted. We can have different effects of pension burden by their financial states within same income group.

First, table 11 shows pension burden crowds out the saving rates of mainly the less-indebted households in all income groups regardless of the change of DTI ratio criteria. The coefficients change slightly since some of heavily-indebted households within each income group are added into the less-indebted households from the heavily-indebted ones as the DTI ratio goes up. Among the less-indebted households, the 1st income group reduces their saving rate the most in response to pension payment and the other income quintiles decrease at around 1 to 12%.

Among the heavily-indebted households, however, the crowding-out effect of pension burden is not significant. There exist the crowding-effects in the 4th quintile only at the DTI ratio of over 10 and 15%. In the other quintiles, the effect is shown but is statistically insignificant in most cases. Our results suggests that the crowd-out effect of pension burden on savings rates in the earlier result and the previous literature mainly comes from the less-indebted households across the income quintiles.

For robustness check, we also look into the cases where the LTV ratio changes this time with a fixed DTI ratio (over 25%) in table 12. Although the sizes of the impact are slightly different as LTV ratio changes among the less-indebted households in table 12, they reduce the saving as pension burden increases as a whole. Similar to the results in table 11, the less-indebted families in the 1st group decrease their savings the most by more than 19% across the LTV ratios and the other groups among the unconstrained families reduce it by more than 0.08 to 13.25 percentage point.

As in the previous results, among the heavily-indebted households the crowding-out effects are not significant and similar to the results in table 11.

Table 11 The Effect of Pension Burden on Saving Rate with LTV>50%

LTV>50%		DTI>10%	DTI>15%	DTI>20%	DTI>25%
Pension Burden (PB) of the Less Indebted by Income Quintiles	δ	–24.34***	–24.00***	–23.88***	–23.10***
	$\delta+\gamma_2$	–5.45***	–5.58***	–9.12***	–8.44***
	$\delta+\gamma_3$	–9.76***	–6.64***	–4.38***	–9.86***
	$\delta+\gamma_4$	–12.46*	–12.42**	–10.12***	–12.55**
	$\delta+\gamma_5$	–3.75***	–4.74***	–2.62***	–1.16***
Pension Burden (PB) of the Heavily Indebted by Income Quintiles	$\delta+\sigma$	–34.92	–33.15	–31.61	–34.27
	$\delta+\gamma_2+\sigma+\varphi_2$	–4.65	1.87	–34.64	–47.02
	$\delta+\gamma_3+\sigma+\varphi_3$	–7.52	–10.75	–0.55	–9.49
	$\delta+\gamma_4+\sigma+\varphi_4$	–4.31*	–1.90*	3.26*	–5.02
	$\delta+\gamma_5+\sigma+\varphi_5$	–9.25	–1.10	–16.31	–16.51
AR(1)		0.000	0.006	0.003	0.019
AR(2)		0.871	0.503	0.330	0.570
Sargan Test		0.000	0.000	0.000	0.000
Hansen Test		0.902	0.676	0.569	0.518
Number of IV		321	319	318	314
Number of Households		1,090	1,090	1,090	1,090
Number of Obs		2,205	2,205	2,205	2,205

Notes: 1) *** $p<0.01$, ** $p<0.05$, * $p<0.1$. 2) The results are gained from system GMM which is valid since Hansen test does not reject the hypothesis that the over-identified model is valid under the assumption of heteroscedasticity. Also, the entire results are written in the appendix.

Table 12 The Effect of Pension Burden on Saving Rate with DTI>25%

DTI>25%		LTV>10%	LTV>30%	LTV>50%	LTV>70%
Pension Burden (PB) of the Less Indebted by Income Quintiles	δ	–24.34***	–24.00***	–23.88***	–23.10***
	$\delta+\gamma_2$	–5.45***	–5.58***	–9.12***	–8.44***
	$\delta+\gamma_3$	–9.76***	–6.64***	–4.38***	–9.86***
	$\delta+\gamma_4$	–12.46*	–12.42**	–10.12***	–12.55**
	$\delta+\gamma_5$	–3.75***	–4.74***	–2.62***	–1.16***
Pension Burden (PB) of the Heavily Indebted by Income Quintiles	$\delta+\sigma$	–34.92	–33.15	–31.61	–34.27
	$\delta+\gamma_2+\sigma+\varphi_2$	–4.65	1.87	–34.64	–47.02
	$\delta+\gamma_3+\sigma+\varphi_3$	–7.52	–10.75	–0.55	–9.49
	$\delta+\gamma_4+\sigma+\varphi_4$	–4.31*	–1.90*	3.26*	–5.02
	$\delta+\gamma_5+\sigma+\varphi_5$	–9.25	–1.10	–16.31	–16.51
AR(1)		0.000	0.006	0.003	0.019
AR(2)		0.871	0.503	0.330	0.570
Sargan Test		0.000	0.000	0.000	0.000
Hansen Test		0.902	0.676	0.569	0.518
Number of IV		321	319	318	314
Number of Households		1,090	1,090	1,090	1,090
Number of Hbservations		2,205	2,205	2,205	2,205

Notes: 1) *** $p<0.01$, ** $p<0.05$, * $p<0.1$. 2) The results are gained from system GMM which is valid since Hansen test does not reject the hypothesis that the over-identified model is valid under the assumption of heteroscedasticity. Also, the entire results are written in the appendix.

2) Effect on household consumption rate

Table 13 indicates the effect of pension burden on household consumption rate by the heavily- and less-indebted households within each income group. The criterion of the household indebtedness is DTI over 25% and LTV over 50%. Thus, as in the previous exercise, households having DTI over 25% with LTV over 50% are considered to be heavily-indebted. Table 13 only reports the relevant estimates and the Appendix includes all estimates for reference.

From table 13, pension burden increases the consumption rate of the less-indebted households across the income quintiles. Especially, pension burden

Table 13 The Effect of Pension Burden on Household Consumption Rate

Dependent Variables		Consumption Rate		
		GEE(AR1)	FE(AR1)	System GMM
Pension Burden of the Less Indebted by Income Quintiles	δ	14.27*** (1.059)	17.83*** (0.741)	14.58*** (2.7)
	γ_2	–10.74*** (1.761)	–15.33*** (1.235)	–12.74*** (2.945)
	γ_3	–12.71*** (1.222)	–15.64*** (1.372)	–11.55*** (2.951)
	γ_4	–13.02*** (1.201)	–16.12*** (1.176)	–11.14*** (2.866)
	γ_5	–10.65*** (1.731)	–15.84*** (1.069)	–11.48*** (3.111)
Pension Burden of the Heavily Indebted by Income Quintiles	σ	11.46 (14.15)	10.85*** (1.664)	15.59** (7.679)
	φ_2	–16.28 (14.49)	–18.6*** (4.548)	–13.24 (9.228)
	φ_3	–14.28 (14.16)	–15.16*** (2.781)	–19.03** (7.946)
	φ_4	–11.31 (14.26)	–13.84*** (3.589)	–19.16** (8.697)
	φ_5	–10.97 (14.5)	–5.473 (4.896)	–5.221 (8.461)
Number of HH (Obs)		613(1,990)	895(1,876)	1,090(2,205)

Notes: 1) Robust standard errors in parentheses *** $p<0.01$, ** $p<0.05$, * $p<0.1$. 2) The criterion of the constrained household is DTI > 25% with LTV > 50%. 3) Sagan Test (0.000) and Hansen Test (0.973).

raises the consumption rate the most by approximately 14.5% in the 1st quintile. The marginal difference between the 1st group and other quintiles among the less-indebted families is over 11 percentage point as a whole.

However, the effect of pension burden on the consumption rate among the highly-indebted families is ambiguous across the income quintiles. Only the 1st group increases the consumption rate, whereas some of marginal differences are negative and insignificant. To be more specific, table 14 shows the effect of pension burden as DTI ratio changes with a fixed LTV ration as criteria of household financial indebtedness.

In table 14, pension burden increases the consumption rates for the less-indebted households across all the income groups. It raises the consumption rate by over 14.5% in the 1st group, whereas it increases by about 1.84 to 3.44 of the consumption rate in the other groups.

However, the effect of pension burden is ambiguous among the heavily-indebted families. The 1st quintile has positive effect of pension on consumption rate among the heavily-indebted households, while the 2nd and the 5th quintile shows insignificant estimates but the 3rd and 4th quintile reduce the consumption rates by the pension burden. Also, as the criterion of DTI ratio goes up, the effects are reduced and even become negative. The 2nd group at DTI of 15% with LTV of 50% and the 3rd and the 4th group at DTI of 25% with LTV of 50% reduce their consumption rates as pension burden goes up.

Table 15 indicates the effect of pension burden on the consumption rate when LTV ratio varies but DTI is fixed at 25%. As a result, National Pension in Korea increases household consumption among the less-indebted households. However, it is ambiguous among the indebted families except the 1st group. The change of LTV ratio implies that higher income groups are less indebted by LTV ratios. But as DTI ration goes up households become more heavily-indebted financially.

To understand whether National Pension has a positive wealth effect on consumption, we recall the lifecycle model. In table 8, it seems to be a positive transfer across all income groups. But it does not consider

Table 14 The Effect of Pension Burden on Consumption Rate with LTV>50%

LTV>50%		DTI>10%	DTI>15%	DTI>20%	DTI>25%
Pension Burden (PB) of the Less Indebted by Income Quintiles	δ	15.54***	14.6***	14.5***	14.58***
	$\delta+\gamma_2$	2.36***	2.37***	1.69***	1.84***
	$\delta+\gamma_3$	3.19***	3.03***	3.02***	3.03***
	$\delta+\gamma_4$	2.35***	2.52***	3.33***	3.44***
	$\delta+\gamma_5$	3.43***	3.21***	3.08***	3.1***
Pension Burden (PB) of the Heavily Indebted by Income Quintiles	$\delta+\sigma$	29.06*	27.61	29.24**	30.17**
	$\delta+\gamma_2+\sigma+\varphi_2$	0.02**	–1.81*	2.07	4.19
	$\delta+\gamma_3+\sigma+\varphi_3$	0.75**	1.06*	0.68**	–0.41**
	$\delta+\gamma_4+\sigma+\varphi_4$	4.31	4.14	2.97**	–0.13**
	$\delta+\gamma_5+\sigma+\varphi_5$	4.80	5.32	10.21	13.47
AR(1)		0.000	0.000	0.000	0.000
AR(2)		0.185	0.215	0.247	0.155
Sargan Test		0.000	0.000	0.000	0.000
Hansen Test		0.332	0.851	0.834	0.977
Number of IV		321	319	318	314
Number of Households		1,090	1,090	1,090	1,090
Number of Observations		2,205	2,205	2,205	2,205

Notes: 1) *** $p<0.01$, ** $p<0.05$, * $p<0.1$. 2) The results are gained from system GMM which is valid since Hansen test does not reject the hypothesis that the over–identified model is valid under the assumption of heteroscedasticity. Also, the entire results are written in the appendix.

Table 15 The Effect of Pension Burden on Consumption Rate with DTI>25%

DTI>25%		LTV>10%	LTV>30%	LTV>50%	LTV>70%
Pension Burden (PB) of the Less Indebted by Income Quintiles	δ	12.84***	14.05***	14.58***	14.63***
	$\delta+\gamma_2$	1.29***	1.45***	1.84***	1.46***
	$\delta+\gamma_3$	2.62***	3.39***	3.03***	3.52***
	$\delta+\gamma_4$	2.39***	2.44***	3.44***	3.58***
	$\delta+\gamma_5$	2.59***	2.31***	3.1**	3.09*
Pension Burden (PB) of the Heavily Indebted by Income Quintiles	$\delta+\sigma$	21.62**	29.47**	30.17**	30.07*
	$\delta+\gamma_2+\sigma+\varphi_2$	1.46	–0.01*	4.19	2.82
	$\delta+\gamma_3+\sigma+\varphi_3$	1.00**	0.62**	–0.41**	–0.28**
	$\delta+\gamma_4+\sigma+\varphi_4$	4.00*	5.87*	–0.13**	0.13**
	$\delta+\gamma_5+\sigma+\varphi_5$	8.87	9.02	13.47	17.30
AR(1)		0.001	0.000	0.000	0.000
AR(2)		0.498	0.198	0.155	0.116
Sargan Test		0.000	0.000	0.000	0.000
Hansen Test		0.965	0.973	0.977	0.975
Number of IV		319	319	314	311
Number of Households		1,090	1,090	1,090	1,090
Number of Observations		2,205	2,205	2,205	2,205

Notes: 1) *** $p<0.01$, ** $p<0.05$, * $p<0.1$. 2) The results are gained from system GMM which is valid since Hansen test does not reject the hypothesis that the over–identified model is valid under the assumption of heteroscedasticity. Also, the entire results are written in the appendix.

Table 16 The Effect of Pension Burden

LTV 50 & DTI 25	Quintile		Saving Rate	Consumption Rate
Pension Burden (PB) of the Unconstrained Households by Income Groups	1st	δ	–23.10***	14.58***
	2nd	$\delta + \gamma_2$	–8.44***	1.84***
	3rd	$\delta + \gamma_3$	–9.86***	3.03***
	4th		–12.55**	3.44***
	5th		–1.16***	3.1***
Pension Burden (PB) of the Constrained Households by Income Groups	1st		–34.27	30.17**
	2nd		–47.02	4.19
	3rd		–9.49	–0.41**
	4th		–5.02	–0.13**
	5th		16.51	13.47

Notes: 1) *** p<0.01, ** p<0.05, * p<0.1. 2) The criterion of the constrained household is DTI>25% with LTV>50%.

financially-indebted households. Since heavily-indebted households have a difficulty of borrowing more, their saving cannot be crowded out and they eventually reduce their consumption.

Based on the lifecycle model, in table 16 when pension burden increases by 1%, the less-indebted households reduce the saving rate by more than 1.16% and increase consumption rate by more than 1.8% across all the income groups. On the other hand, in the heavily-indebted households, although the 1st group increase consumption rate by more than 30%, the effects are ambiguous as a whole.

Thus, we conclude that National Pension have a positive wealth effect on the less-indebted households and the impact is the biggest to the lowest income group due to the redistributive component in its benefit scheme so that even the heavily-indebted households in the 1st group increase their consumption. But the effect of pension burden for the other indebted households diminishes and becomes negative since their debts reduce the relative interest rate of National Pension.

5. CONCLUSION

This paper studies the effects of pension contribution on household saving and consumption across income quintiles under financial indebtedness. We find that the household pension payment crowds out household saving as the previous literature has found. As in Kim *et al*. (2008), our result shows that the crowding-out effect on household saving is the highest in the lowest income quintile. This effect, however, arises mainly from the less indebted households, but not from the heavily indebted households. Also, the positive wealth effect of the pension benefit on household consumption is the highest in the lowest income quintile. The effects on household consumption show that the national pension program in Korea has a positive wealth effect on the less indebted households consumption since the internal rate of return from pension is higher than the market interest rate and the pension benefits includes the redistributive components in it. The heavily indebted households, however, reduce their consumption due to the tight financial constraint. Therefore, we argue that households' financial states are also important factors in investigating the effects of public pension on household expenditure since household indebtedness is likely to change the overall effect of the pension even in the recent low-interest rate era.

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