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The Retirement Consumption Puzzle in Korea

한국의 은퇴 소비 퍼즐

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Abstract

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Every household saves with farsighted optimization to have stable path of consumption in life cycle model context. Therefore, the theory attributes a drop of consumption after retirement to individual's preference, budget constraint and tastes for leisure and work related expenses. It is an important empirical issue whether a systematic relation between wealth and consumption is really existed according to life cycle theory. Using Korea Labor and Income Panel study, I find little evidence of the relation between wealth and consumption in contrary to life cycle model. Lower wealth households are associated with a larger discontinuity of consumption, however, this decline is derived from a drop of complementary goods of leisure as well as work related expenses. Moreover, retired households consume less than nonretired households across wealth quartile. As a result, these findings suggest that households with lower wealth seem to save insufficiently or have myopic financial decision making.

keywords : Retirement consumption puzzle, Retirement, Consumption, a Life cycle hypothesis, KLIPS
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I. Introduction

Consumption smoothing is the result of optimal decision making of rational individual according to life cycle theory. (Modigliani,1954; Friedman,1957) However, a significant fall in consumption at retirement has been reported in a number of countries and considered as an important empirical issue. This sharp decline in consumption at retirement is called retirement consumption puzzle if it cannot be explained as life cycle theory.

A significant fall in consumption at retirement could be considered as that household saves insufficiently with shortsighted financial optimization.[1] However, life cycle demonstrates that low saving is merely the result of individual's preference. For instance, variations in saving are explained by time preference. Impatient households should consume more than patient households early in life so that they consume less than tolerant households later in life. Therefore, patient households could accumulate more wealth for retirement. Variations in wealth that result from this factor should explain a positive correlation between wealth and the consumption growth rate. Likewise, within the budget constraint context, the existence of consumption discontinuity implies higher consumption and less wealth accumulation before retirement. In other words, households prefer a consumption profile with a discontinuity at retirement. If such factor account for the variation in saving, one should observe a negative correlation between retirement wealth and the size of discontinuity. Factors that can generate sharp changes in consumption include work-related expenses or preferences for leisure substitutes.

Therefore, this paper shows whether the consumption fall after retirement is explained by insufficient saving or by the result of optimal choice of households if a drop exits.

In Korea, some literatures has documented the retirement consumption issue. Chong-Bum An et al(2005) argue that the consumption drop at the retirement is

1) Below explanation is from B. Douglas Bernheim et al(2001)

statistically insignificant so that it is consistent with the life cycle model. Ha-Nam Phang et al (2009) assert that the retirement of the head rather increases the consumption[2]. Sanghun Seok et al (2009) claim that the consumption does not fall regardless of retirement of head. Jaeho Yun(2011) show that there exits a consumption drop in wealth quartile 1 using empirical strategy of treatment effect.

Most of literatures define retirees as people who are leaving completely in labour market or are working below certain hours. These definitions of retiree should the threshold of labour hours by artificial or could not consider the remainder of labour market.

This paper includes households who remain in the labour market but reduce labour hours dramatically as well as people who entirely leave the labour market. Therefore, the paper contributes to definition of retirees using Korea Labor and Income Panel Study(KLIPS) and reveals the existence of a correlation between wealth and consumption adopting the empirical method of Bernheim et al(2001) and propensity score matching. Moreover, this paper compares the change of consumption between paid worker and self employment.

The first main finding of this paper is that there exists a consumption drop across wealth quartile. There is a negative corelation between the discontinuity and wealth. The second finding is that this discontinuity is mostly derived from a drop of paid worker. The third main finding is that in the lowest wealth quartile, consumption profile can not be explained by life cycle theory. Their consumption drop is associated with not only decline of work related expenses but also a drop of spending complement of leisure. Otherwise, the highest wealth quartile decrease work related expenses. In addition, the level of consumption in retired households is small across wealth quartile in comparison with nonretired households. In conclusion, this paper suggests that a lower wealth quartile might save insufficiently or should be explained by other alternative theory instead of life cycle theory.

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2) Jaeho Yun et al(2011)

II. Literature Review

<Table 1> Consumption Growth Rates in Industrialized Countries

Country	Log Consumption
U.S.A	−0.1602***
	(0.032)
U.K	−0.0178
	(0.0179)
China	−0.18***
	(0.043)
Italy	−0.0983*
	(0.0567)
Korea	−0.063***
	(0.023)

A significant fall in consumption at the time of retirement has been reported in industrialized countries. Many economists have paid attention the post retirement consumption due to significant discontinuity between pre and post retirement. <Table 1> shows the discontinuity of consumption varying countries. Hongbin Li et al(2015) present that China has a consumption fall after retirement by 18%. Battisin et al(2009) demonstrate that non durable expenditure is decreased when the male is retired in Italy. John Laitner et al(2006) show a consumption drop near retirement by 18% in the United States. Insook Cho(2012) asserts that retired households decrease consumption after retirement in Korea by 6%. Sarah smith(2006) shows a drop in consumption in the United of Kingdom(1.7%). China has the largest consumption fall after retirement in <Table 1> followed by the U.S.A., Italy, Korea and the United of Kingdom.

Several literatures has explained fall in consumption at retirement within the context of life cycle model. James Banks et al(1998) show that there is drop in consumption at retirement in U.K., which can be explained by the unexpected negative information in terms of life cycle model. Sarah smith(2006) documents a

significant fall in food spending if people retired voluntarily and it is linked to a negative wealth shock. Hurd and Rohwedder (2005) and Hurst(2008) argue that consumption decreased due to home production activities. Battisin et al(2009) interpret falls to be the result of drop in the number of grown children living with their parents as well as in goods that are work-related. Hongbin Li et al(2015) show that if a life cycle model with home production is considered, the retirement consumption puzzle is not be a puzzle in China.

However, B. Douglas Bernheim et al(2001) take the decline to be evidence against life cycle theory. They cast doubt on theories showing that consumption growth rates near retirement do not vary with retirement wealth and discontinuity in consumption is not confined to work-related expenses.

Korean literatures have explained drops in consumption after retirement in terms of life cycle theory. Chong-Bum An et al(2003) show that retirement does not have any effect on consumption but early retirement reduce the household's expense in Chong-Bum An et al(2004). Early literatures used a retirement dummy variable for retirement consumption puzzle analysis. However, the change of consumption is largely influenced by other independent variables. Therefore, recent papers consider the puzzle varying household's characteristics. Jaeho Yun et al(2010) and Insook Cho(2012) show the consumption change across wealth quartile and demonstrate that there exists a significant drop in lower wealth quartile. In addition, Insook Cho(2012) suggests that the discontinuity of consumption is mainly derived from work related expenditure.

Ⅲ. Data

The primary data sample for this analysis consists of the set of all households surveyed in the Korea Labor and Income Panel Study(KLIPS) between the years 2000 and 2014. KLIPS contains labour hours of individual, consumption, wealth, income data in detail. Consumption and income are measured in 2010 price. To

provide functional flexibility, I divide the sample into four quartile based on wealth which is average of three year before retirement. People who have the lowest amount of wealth is defined as quartile 1. I define a household to be retired if the labour hours of the head or the spouse falls discontinuously. In addition, households whose labour hours (head and spouse) does not increase after retirement are only considered for samples. More specifically, a household is defined as a retired household whose head or spouse leave the labour market in the current and subsequence years. Additionally, using maximal chow test a household is defined as a retired household if the labour hour has a sharp decline to complement the case of partial retirement. Using this method, households who still remain in the labour market could be included for the final sample.

Chow test is the test whether the structure break exists(Chow, Gregory C,1960). That is, it tests the two equations before and after τ are equal

$$y_t = \beta_1 + \beta_2 x_t + u_{1t}, t = 1, \ldots, \tau$$
$$y_t = \delta_1 + \delta_2 x_t + u_{2t}, t = 1 + \tau, \ldots, T$$

where, y is labour hour and x is the year between 2000 and 2014.

The maximal chow test is used when a break point is unknown. In every potential break point, chow test is used and the point in which the f statistics is maximized is chosen as a break point.

$$QLR_T = \max, F_T(\tau),\ 10\%\ significance\ level$$

This strategy does not set specific labor hours to define the retiree and not consider reemployment. However, the chow test can not exclude the data of reemployment and discontinuously increased labour hour. Therefore, imposing more strict conditions to data I delete samples when labour hour is increasing at a break point, the variance of within group is bigger than the variance of between group. As deleting if the variance of within group is bigger than the variance of

between group, reemployed samples or unstable labour status could be excluded. Moreover, the maximal legal labour hour in a week is 40 hours in Korea so that if head or spouse work more than 40 hours after retirement, the household is excluded in the sample. Appendix contains the graph of labour hours of retired households.

The variable t is set equal to -1 in the last year of non retirement and equal to +1 in the first year of retirement.

The total sample used in this analysis includes 2449 observations of 237 households with the specific number depending on the regression specification.

KLIPS contains ideal data on consumption to figure out which composition of consumption is mainly changed. Using this consumption data I discuss regression results for each component in section Ⅴ.

<Table 2> Summary Statistics

Variable	Mean	Median	Standard deviation	Minimum	Maximum
Age	63.04	62	7.08	46	83
Income replacement rate	0.358	0.222	0.448	0	3.75
Wealth	6623	2250	14832	0	121333
Difference in log consumption $(t_{-1/-2} - t_{+1/+2})$	-0.212	-0.24	0.5	-2.7	1.99
Family size	2.7	3	1.29	1	7

<Table 2> shows substantial variation of wealth and this means heterogeneity in retirement preparation. The second to last row is log consumption change between the two years prior to retirement and the two years after retirement(B. Douglas Bernheim et al,2001). This presents that consumption generally falls after retirement. Income replacement rate is the ratio of average non asset income in three year postretirement to non asset income in three years prior to retirement(B.

Douglas Bernheim et al,2001). The average of it is 0.359 and means that postretirement income is about 35% of preretirement income. <Figure 1> shows consumption path of retired households. The vertical axis is the level of consumption. The horizontal axis is year relative to retirement(0 refers to the year of retirement and +2 refers to the second year after retirement). In this figure, consumption decreases through their life. <Figure 2> is consumption path for paid worker. There exists a drop in consumption across wealth quartile.

<Figure 1> Consumption Change by Wealth Quartile

<Figure 2> Consumption Change of Paid Worker by Wealth Quartile

<Figure 3> Consumption Change of Self Employment by Wealth Quartile

<Figure 3> is self employment's consumption change. A higher quartile seems to smooth consumption compared with paid worker. Even if the variation of consumption is quite large, the highest wealth quartile are likely to smooth their consumption. Even in a lower quartile, the magnitude of consumption is smaller than paid worker.

Ⅳ. Empirical Model

The empirical model of this paper adopts the strategy used in Bernheim et al(2001) to show the consumption change depending on wealth and income.
The general approach is the function of the following form[3].

(1) $\triangle \ln(C_{it}) = \xi(t, X_i) + \Gamma \triangle Z_{it} + \zeta_{it}$

,where $\triangle \ln(C_t) = \ln(C_{t+1}) - \ln(C_t)$, C_{it} is the consumption at the retirement and t is measured relative to retirement. X_i is a vector of fixed household characteristics, Γ is a vector of parameters, Z_{it} is a vector of demographic factors that may change through time and ζ_{it} is a disturbance term.

We can think of (1) as a consumption Euler equation allowed for shifts in demographic determinants of marginal utility. This expression is derived from single period utility given by $U(C_{it}\exp(\Gamma Z_{it}))$ and $U(\bullet)$ belong to the CRRA family of utility functions. Within this framework, the function $\xi(t, X_i)$ captures the effects of household preferences and aging on the slope of the consumption profile. When we interpret the Euler equation of (1), then it is natural to assume that the consumption shock ξ_{it} is serially uncorrelated and independent of all information to the household at time t. However, if household consumption is measured with error, the estimated residuals for equation (1) may show negative serial correlation. Consequently, when we estimate equation (1) we use clustered Huber-White standard error to correct the correlated structure of the within household covariance matrix.

In order to estimate the consumption growth rates, one can estimate different form of equation. Equation (1) is mathematically identical to the following equation (2). τ and T is defined as the first and last year in which the households is observed. Let $v_{it} \equiv \sum_{k=\tau+1}^{t} \zeta_{it}$ (the cumulative consumption since time τ) and $\overline{v_i} \equiv (T-\tau)^{-1} \sum_{k=\tau+1}^{T} v_{ik}$ (households' average consumption). Then (2) follows from (1), with $\mu_i \equiv \ln(C_{i\tau}) + \overline{v_i}$, $\eta_{it} \equiv v_{it} - \overline{v_i}$ and $\psi(t, X_i) \equiv \sum_{k=\tau+1}^{t} \xi(k, X_i)$.

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3) Following explanatory of the empirical strategy in this section cites Bernheim et al(2001)

(2) $\ln(C_{it}) = \mu_i + \psi(t, X_i) + \Omega Z_{it} + \eta_{it}$

where μ_i is a household fixed effect, ψ is a function, Ω is a vector of parameters, η_{it} is a mean zero random variable, and all other symbols are defined as before. I adopt the following flexible functional form

(3) $\psi(t, X_i) = X_i \beta_t$

where β_t is a vector of parameters. The formulation permits the parameter vector to vary with age relative to retirement t. Thus, estimates of ψ imply an expected consumption trajectory for each household with the fixed characteristics of the household. Even though it is possible to estimate a separate β_t each value of t, this requires the estimation of a very large number of parameters. Therefore, I impose the restriction that β_t is constant within consecutive two year intervals.

Another empirical strategy of this paper is propensity score matching to compare between the consumption of retired households and nonretired households. Propensity score presents the probability of treatment and after it is estimated, treatment effect is adopted(Wooldridge ,2002). Especially, average treatment effect matches each subject to a single subject with the opposite treatment whose propensity score is closest (Abadie et al ,2006). With this propensity score matching, one can implement difference in difference strategy. In other words, the difference of consumption between nonretired and retired households is estimated in addition to the difference of consumption between the former and the latter part.

In more detail, retirement is defined as treatment and treatment effect on consumption is estimated.[4] When C_R , C_{NR} and R are defined as the consumption of retirement , non retirement and retirement, respectively, the random variable

4) Below explanation about propensity score cites Jaeho Yun et al(2010)

interested is $C_R - C_{NR}$ and the average treatment effect is defined as following equation (4).

(4) $ATE \equiv E[C_R - C_{NR}]$

Observable variable is real consumption of household and it is the following form.

(5) $C = (1-R)C_{NR} + RC_R = C_{NR} + R(C_R - C_{NR})$

With the definition of propensity score as
(6) $p(X) \equiv P(R=1|X)$, the following is obtained.

(7) $ATE = E([R - p(X)]C/p(XP[1-p(X)])$, where X is demographic factors. Consistent estimator of ATE is following form.

(8) $\widehat{ATE} = N^{-1}\sum_{i=1}^{N}[R_i\hat{p}(X_i)]C_i/\hat{p}(X_i)[1-\hat{p}(X_i)]$

Using logit model, propensity score is estimated and subjects are matched based on propensity score. With this subjects, OLS regression is used with wealth quartile dummy variables. In the regression, $\triangle C \equiv C_{t+1} - C_t$ for consumption C is a dependent variable for difference in difference strategy.

V. Basic Results

This section discusses the variations in post-retirement consumption growth rate among different wealth groups. The following <Table 3> is the estimation of equation (3).

<Table 3> The Result of Regression : Consumption Growth Rates

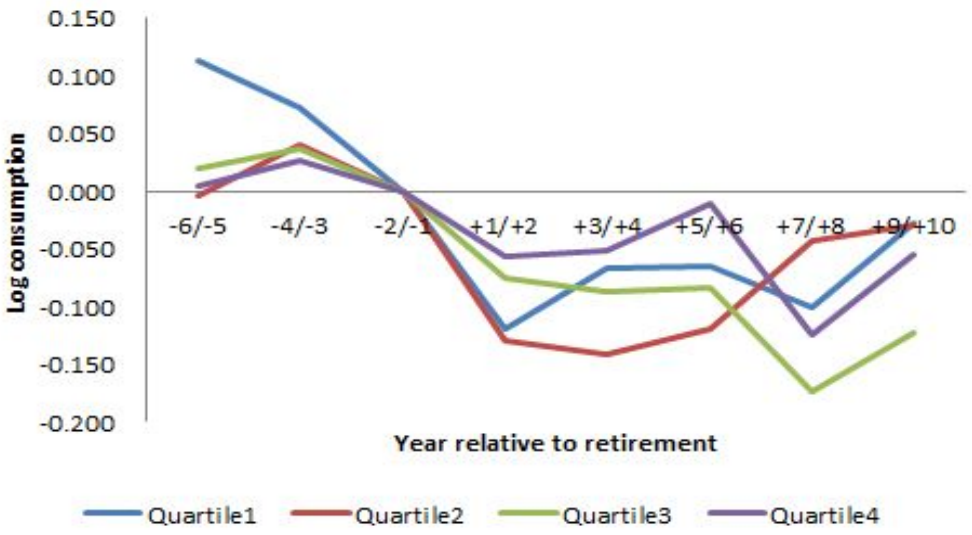
	Post retirement
Wealth quartile 1	-0.164***
	(0.057)
Quartile 2	-0.159**
Quartile 3	-0.113**
Quartile 4	-0.086*
R^2	0.1837

Notes: N= 2449. All significance test use robust standard error clustered by household(237). Robust standard errors are in parentheses. Additional variables are family size, disability, age of household head.

Column 1 reports the post-retirement consumption growth rate of four equally sized wealth groups depending on the size of pre-retirement net wealth. The results in column 1 indicate that the households in the lowest wealth quartile lower their consumption by 16% at the 1% level. The households in the second and third wealth quartile lower their consumption by 15% and 11% respectively. Consumption of the highest wealth quartile decreases by 8%. The less wealth household holds the more consumption growth rate falls. In other words, there exists a negative correlation between retirement wealth and the size of discontinuity.

<Figure 4> shows consumption drop after retirement across all wealth quartile. The horizontal axis is year relative to retirement. The vertical axis is normalized consumption. The normalized consumption is measured as the ratio of a household's consumption to its consumption during the first and second years before retirement. This figure is derived from specification of equation (3).

<Figure 4> Consumption Path Across Wealth Quartile



<Table 4> shows associated specific estimates. Each column represents different the consumption growth rate (-5 means the fifth year before retirement and +5 means the fifth year after retirement). Consumption growth rate decreases after retirement in all wealth group. The first row shows the consumption for households in the lowest wealth quartile. Especially, there is the largest consumption drop in wealth quartile 2. In the lowest wealth quartile, the decline of consumption is -0.119 and in the second wealth quartile it is -0.13. In subsequent year, quartile 2 has the largest consumption drop. However, in the seventh years after retirement, quartile 1 falls larger than quartile 2. Otherwise quartile 2 reduce the level of fall in consumption from the seventh years after retirement. It derives that in <Table 4> the lowest quartile has larger discontinuity of consumption that quartile 2.

<Table 4> The Result of Regression : Consumption Shifts

	Interaction term with year relative to retirement						
	-6/-5	-4/-3	+1/+2	+3/+4	+5/+6	+7/+8	+9/+10
Wealth	0.113	0.073	-0.119**	-0.067	-0.065	-0.101*	-0.028
quartile 1	(0.095)	(0.061)	(0.049)	(0.048)	(0.049)	(0.055)	(0.064)
Quartile 2	-0.005	0.040	-0.130**	-0.141**	-0.119*	-0.044	-0.029
Quartile 3	0.019	0.036	-0.075	-0.086*	-0.084	-0.173**	-0.124
Quartile 4	0.004	0.027	-0.057	-0.051	-0.011	-0.125	-0.056
R^2				0.1969			

Notes: N= 2449. All significance test use robust standard error clustered by household(237). Robust standard errors are in parentheses. Additional variables are family size, disability, age of household head. -7/-8 and -9/-10 columns are omitted due insufficient space of paper.

The following <Table 5> indicates the consumption growth rate for paid worker varying wealth quartile. The job position is defined as the job right before the retirement. Across wealth quartile, there exists a significant consumption drop. Especially, wealth quartile 2 has sharp consumption fall by 28%. In quartile 3, the decline of consumption is -0.176 and is a larger consumption drop than quartile 1(-0.166). <Table 6> shows consumption growth rate in more detail using equation (3). There is a drop within the first two year of retirement in quartile 1 by -0.164. In common with <Table 5> the decline of the consumption is the largest in quartile 2. <Table 5> and <Table 6> shows that there is the largest decline of consumption in quartile 2 for paid worker.

<Table 5> The result of regression : Consumption Change of paid worker

	Post retirement
Wealth quartile 1	-0.166** (0.076)
Quartile 2	-0.288***
Quartile 3	-0.176**
Quartile 4	-0.100
R^2	0.1860

Notes: N= 1100. All significance test use robust standard error clustered by household(103). Robust standard errors are in parentheses. Additional variables are family size, disability, age of household head.

<Table 6> The result of regression : Consumption Change of paid worker

	Interaction term with year relative to retirement						
	-6/-5	-4/-3	+1/+2	+3/+4	+5/+6	+7/+8	+9/+10
Wealth quartile 1	0.105 (0.123)	-0.017 (0.088)	-0.164** (0.075)	-0.049 (0.070)	-0.024 (0.075)	-0.042 (0.071)	0.030 (0.098)
Quartile 2	-0.033	0.120	-0.209***	-0.228***	-0.171**	-0.136	-0.036
Quartile 3	0.090	0.043	-0.095	-0.132*	-0.110	-0.113	-0.076
Quartile 4	-0.057	0.059	0.025	-0.061	0.028	-0.112	0.069
R^2				0.2115			

Notes: N= 1100 All significance test use robust standard error clustered by household(103). Robust standard errors are in parentheses. Additional variables are family size, disability, age of household head.

<Table 7> shows the consumption growth rate for self employment. Contrary to paid worker, there is only consumption fall in quartile 1 by 11% after retirement. Other wealth quartile does not show any significant consumption drop after retirement.

<Table 7> The Result of Regression : Consumption Growth Rates for Self Employment

	Post retirement
Wealth quartile 1	-0.111*
	(0.06)
Quartile 2	0.022
Quartile 3	-0.055
Quartile 4	-0.07
R^2	0.1448

Notes: N= 985. All significance test use robust standard error clustered by household(94). Robust standard errors are in parentheses. Additional variables are family size, disability, age of household head.

Similarly to <table 7>, <table 8> suggests consumption growth rate does not fall varying wealth quartile in the case of self employment. Only in the ninth and tenth years after retirement consumption growth has significant negative change in wealth quartile 3.

<Table 8> The Result of Regression : Consumption Shifts for Self Employment

	Interaction term with year relative to retirement						
	−6/−5	−4/−3	+1/+2	+3/+4	+5/+6	+7/+8	+9/+10
Wealth quartile 1	0.036	0.072	−0.092	−0.049	−0.104	−0.157	−0.091
	(0.116)	(0.081)	(0.080)	(0.070)	(0.078)	(0.108)	(0.099)
Quartile 2	0.030	−0.008	0.018	−0.020	0.002	0.165	−0.009
Quartile 3	−0.072	0.042	−0.037	−0.036	−0.010	−0.159	−0.207*
Quartile 4	0.111	−0.002	−0.106	−0.047	−0.012	−0.123	0.128
R^2				0.1758			

Notes: N= 985. All significance test use robust standard error clustered by household(94). Robust standard errors are in parentheses. Additional variables are family size, disability, age of household head.

Ⅵ. The Composition of Consumption

In section Ⅴ, it is verified that the discontinuity of consumption exists at retirement. This section shows whether this discontinuity at retirement is the result of optimal choice by rational agent. In life cycle context, as a household reduce their labour hours after retirement the consumption fall is caused by the decline of work related expenses (cloth, transportation and eating out). In addition, retired households increase to spend time at home so that they reduce expenses of substitute of leisure and produce by themselves at home instead of purchase. Therefore, this section presents which items is changed most by leaving labour market.

<Table 9> The Result of Regression : Consumption Growth Rates by Composition of Consumption

	Food at home	Food away from home	Management of house	Education	Fuel	Cloth	Transportation	Culture
Budget Share	23.31	2.64	12.8	5.7	7.0	2.81	3.50	2..39
Wealth quartile 1	-0.113* (0.059)	-0.614*** (0.22)	-0.17** (0.078)	0.045 (0.18)	0.096 (0.23)	-0.27 (0.17)	-0.14 (0.16)	-0.46*** (0.14)
Quartile 2	-0.054	-0.490	-0.15***	-0.253	-0.18	-0.107	0.072	-0.108
Quartile 3	-0.020	-0.160	-0.048	-0.487	-0.047	-0.39**	0.032	-0.128
Quartile 4	0.161*	-0.284	0.035	-0.185	-0.397	-0.239	-0.093	-0.198
R^2	0.053	0.030	0.0105	0.167	0.047	0.016	0.01	0.0804

Note: The budget share is the proportion of consumption expenditure on each item in total average consumption two year prior to retirement. All models include control variables listed in above tables. Additional variables are family size, disability, age of household head.

<Table 9> illustrates the effects of retirement on household consumption for different items. Row 1 of <Table 9> indicates the budget share for each item as a proportion of average consumption two year prior to retirement. The result shows that retired households reduce consumption on food away from home (61.4%), food at home(11.3%) in quartile 1. They decrease both food expenses at home and away from home. Following life cycle theory, retired households pursue to cook food at home so that expenses of food at home would increase. Otherwise, quartile 4 increase their food consumption at home (16%) which is explained within life cycle context. The representative work related consumption such as fuel and transportation expenses has no change after retirement. In quartile 3, cloth expenses, another primary work related consumption, is decreased by 39%. In quartile 1, culture expenses which are complement of leisure are also decreased

by 46%. Moreover, they fall expense in management of house by 17%. There is a drop in consumption of house management in quartile 2 by 15%. In sum, the lowest quartile reduce expense of food at home, house management and culture in contrast to life cycle explanation.

<Table 10> The Result of Regression : Consumption Shifts of Food At Home

	Interaction term with year relative to retirement				
	−7/−8/−9	−4/−5/−6	+1/+2/+3	+4/+5/+6	+7/+8/+9
Wealth quartile 1	0.058	0.170*	−0.016	−0.070	−0.055
	(0.108)	(0.101)	(0.038)	(0.051)	(0.043)
Quartile 2	0.034	−0.049	−0.067	−0.067	0.048
Quartile 3	−0.056	−0.406	−0.039	−0.063	−0.086
Quartile 4	−0.384	−0.024	0.082*	0.061	0.039
R^2			0.0758		

Notes: N= 2449. All significance test use robust standard error clustered by household(237). Robust standard errors are in parentheses. Additional variables are family size, disability, age of household head.

In more detail, within the third year of retirement, quartile 4 increase their consumption of food at home by 8%. There is negative trend after retirement in the lowest quartile even if a drop of consumption is not significant. <Table 11> shows the consumption of food away from home. Quartile 1 shows the consumption drop by 41%. <Table 12> presents the fee of management house such as monthly rent, water or electric charge. In the lowest quartile, the estimated decline of consumption is −0.124 which means a consumption drop by 12%. They might use water or electricity less than before retirement or move to smaller house with cheaper monthly rent.

<Table 11> The Result of Regression : Consumption Shifts of Food Away From Home

	Interaction term with year relative to retirement				
	-7/-8/-9	-4/-5/-6	+1/+2/+3	+4/+5/+6	+7/+8/+9
Wealth quartile 1	-0.153	-0.161	-0.363	-0.415*	-0.404
	(0.337)	(0.498)	(0.179)	(0.225)	(0.217)
Quartile 2	0.201	0.383	-0.304	-0.379	-0.432
Quartile 3	-0.190	-0.854	-0.363	-0.326	-0.294
Quartile 4	0.079	-0.063	-0.308	-0.239	-0.019
R^2			0.0343		

Notes: N= 2449. All significance test use robust standard error clustered by household(237). Robust standard errors are in parentheses. Additional variables are family size, disability, age of household head.

<Table 12> The Result of Regression : Consumption Shifts of Management House

	Interaction term with year relative to retirement				
	-7/-8/-9	-4/-5/-6	+1/+2/+3	+4/+5/+6	+7/+8/+9
Wealth quartile 1	0.039	-0.140	-0.124*	-0.073	-0.073
	(0.085)	(0.151)	(0.064)	(0.073)	(0.062)
Quartile 2	0.107	-0.240	-0.052	-0.067	-0.089
Quartile 3	-0.137	-0.193*	-0.084	0.006	-0.065
Quartile 4	-0.043	-0.248	0.084	0.083	0.003
R^2			0.0186		

Notes: N= 2449. All significance test use robust standard error clustered by household(237). Robust standard errors are in parentheses. Additional variables are family size, disability, age of household head.

<Table 13> and <Table 14> indicate consumption of education and fuel respectively and do not show any consumption change after retirement.

<Table 13> The Result of Regression : Consumption Shifts of Education

	Interaction term with year relative to retirement				
	−7/−8/−9	−4/−5/−6	+1/+2/+3	+4/+5/+6	+7/+8/+9
Wealth quartile 1	0.008	−0.366	−0.155	0.008	−0.018
	(0.321)	(0.363)	(0.147)	(0.174)	(0.155)
Quartile 2	−0.207	−0.202	−0.363	−0.226	−0.124
Quartile 3	0.605*	1.172**	−0.323	−0.175	−0.276
Quartile 4	0.450	1.169*	0.211	−0.374	−0.519
R^2			0.1821		

Notes: N= 2449. All significance test use robust standard error clustered by household(237). Robust standard errors are in parentheses. Additional variables are family size, disability, age of household head.

<Table 14> The Result of Regression : Consumption Shifts of Fuel

	Interaction term with year relative to retirement				
	−7/−8/−9	−4/−5/−6	+1/+2/+3	+4/+5/+6	+7/+8/+9
Wealth quartile 1	0.109	0.505	0.141	0.260	−0.133
	(0.345)	(0.608)	(0.133)	(0.213	(0.182)
Quartile 2	0.075	−0.500	−0.389	−0.217	−0.089
Quartile 3	−0.134	−0.264	−0.007	−0.209	−0.398
Quartile 4	0.024	0.005	−0.341	−0.219	−0.351
R^2			0.0536		

Notes: N= 2449. All significance test use robust standard error clustered by household(237). Robust standard errors are in parentheses. Additional variables are family size, disability, age of household head.

<Table 15> indicates consumption change of cloth. Quartile 1 show the consumption drop within 3 years after retirement by 23%. The highest quartile drops their expense of cloth by 34%. Between the fourth year and sixth year of retirement, quartile 3 decrease expenses of cloth by 38%.

<Table 15> The Result of Regression : Consumption Shifts of Cloth

	Interaction term with year relative to retirement				
	-7/-8/-9	-4/-5/-6	+1/+2/+3	+4/+5/+6	+7/+8/+9
Wealth quartile 1	0.216	0.339	-0.234*	-0.174	-0.127
	(0.215)	(0.297)	(0.137)	(0.144)	(0.160)
Quartile 2	0.142	0.373	-0.086	-0.042	-0.097
Quartile 3	0.093	0.078	-0.155	-0.380*	-0.450
Quartile 4	0.008	-0.472	-0.346**	-0.080	-0.399
R^2			0.0235		

Notes: N= 2449. All significance test use robust standard error clustered by household(237). Robust standard errors are in parentheses. Additional variables are family size, disability, age of household head.

<Table 16> represents the consumption change of transportation. There is a negative trend but is not significant change.

<Table 17> is the consumption change of culture. As retirees have more leisure time, they may spend time and money on a culture life following life cycle theory. However, quartile 1 shows consumption fall within sixth years after retirement. The expenses fall by 28% within the first 3 years and by 19% within sixth years after retirement. As a result, quartile 1 does not show consumption profile corresponding with life cycle theory. However quartile 4 shows the consumption change from work related consumption to consumption of complement of leisure time.

<Table 16> The Result of Regression : Consumption Shifts of Transportation

	Interaction term with year relative to retirement				
	−7/−8/−9	−4/−5/−6	+1/+2/+3	+4/+5/+6	+7/+8/+9
Wealth quartile 1	0.196	0.665*	−0.054	−0.101	−0.050
	(0.218)	(0.352)	(0.126)	(0.118)	(0.127)
Quartile 2	0.152	0.317	0.095	0.095	0.137
Quartile 3	−0.556	−0.458	−0.107	−0.006	−0.190
Quartile 4	−0.113	−0.226	−0.153	−0.114	−0.157
R^2			0.0192		

Notes: N= 2243. All significance test use robust standard error clustered by household(237). Robust standard errors are in parentheses. Additional variables are family size, disability, age of household head.

<Table 17> The Result of Regression : Consumption Shifts of Culture

	Interaction term with year relative to retirement				
	−7/−8/−9	−4/−5/−6	+1/+2/*3	+4/+5/+6	+7/+8/+9
Wealth quartile 1	−0.220	0.236	−0.289**	−0.196*	−0.146
	(0.217)	(0.3)	(0.118)	(0.111)	(0.137)
Quartile 2	−0.167	−0.257	0.021	−0.035	0.163
Quartile 3	−0.481**	−0.327	−0.184	−0.126	−0.056
Quartile 4	−0.104	−0.239	−0.114	−0.104	0.134
R^2			0.0833		

Notes: N= 2248. All significance test use robust standard error clustered by household(237). Robust standard errors are in parentheses. Additional variables are family size, disability, age of household head.

Ⅶ. Propensity Score Matching

<Table 18> shows average treatment effect by wealth quartile. The table suggests whether the difference of change in consumption between retired and non retired households is statistically significant. The consumption of retired households in the lowest quartile is less than nonretired households by 194.98(henceforth, the unit is 10 thousand won). Moreover, the second quartile and the third quartile of retired households consume less than nonretired households by 210.66 and 163.43, respectively. Retired households in the second quartile shows the largest difference of consumption between nonretired households and retired households. In comparison with the previous section, within the sixth year the second quartile drop their consumption at most. Similarly, when the head of retired households was a paid worker before retirement, the consumption of the second quartile falls largely. <Table 18> would be consistent with those facts.

<Table 18 > The Result of Propensity Core Matching

	Average Treatment Effect
Wealth quartile 1	-194.98**
	(85.44)
Quartile 2	-210.66***
	(80.52)
Quartile 3	-163.43***
	(58.14)
Quartile 4	-98.18
	(63.67)
R^2	0.0058

Notes: N=24264. Standard errors are in parentheses. Family size, disability, age of household head. Wealth, marital status and work status are controlled by matching and year dummy variable is contained in a regression. The dependent variable is the difference of consumption between consecutive years.

<Table 19> presents the result of treatment effect by composition of consumption. There is negative trend across wealth and the composition. The second quartile of households consume less by 24 than nonretired households in food away from home and less by 17 in cloth expenses. Both the second and third quartile's consumption is smaller by 21 and 18,respectively in the management cost in their house. Moreover, this table suggests that the highest quartile invest less in education for their offspring than retired households. In education expenses, the highest wealth quartile of retired households spend less than nonretired households by 51. The difference of consumption between retired and non retired households can be said to mainly exist in work related consumption if assuming that the difference of expenses in management of house and education is merely due to attrition of members or growth of child. If not so, the retired households would spend less in basic expenses for water, electricity and they provide their offsprings insufficient education, which the life cycle theory can not predict.

<Table 19> The Result of Propensity Core Matching by Composition of Consumption

Dependent Variables	Food at home	Food away from home	Management of house	Education	Fuel	Cloth	Transportation	Culture
Wealth quartile 1	-4.10	-14.76	-21.91*	-42.08	14.67	-0.07	-9.43	3.93
	(18.82)	(10.71)	(12.84)	(37.19)	(18.01)	(7.79)	(6.06)	(16.76)
Quartile 2	-22.85	-24**	3.23	-18.39	-15.9	-17.36**	-9.06	-1.66
	(17.74)	(10.09)	(12.10)	(35.05)	(16.98)	(7.34)	(5.57)	(15.79)
Quartile 3	2.39*	0.91	-18.90**	-20.47	-31***	-4.10	-0.51	-0.20
	(12.81)	(7.29)	(8.74)	(25.31)	12.26)	(5.30)	(4.04)	(11.40)
Quartile 4	-17.12	-2.23	-13.22	-51.59*	-6.54	7.03	-1.89	0.27
	(14.03)	(7.98)	(9.57)	(27.71)	(13.42)	(5.81)	(4.49)	(12.49)
N	24255	24262	24260	24264	24256	24258	22124	24264
R^2	0.0028	0.0001	0.0028	0.0023	0.0019	0.0052	0.00047	0.0127

Note: Family size, disability, age of household head. Wealth, marital status and work status are controlled by matching and year dummy variable is contained in regressions. The dependent variable is the difference of consumption between consecutive years.

Ⅷ. Conclusion

This paper shows that there exists a consumption drop after retirement in Korea and casts doubt on power of explanation of life cycle with respect to the discontinuity of consumption. In other word, this paper tests whether the agent consume through their life with farsighted optimal decision. Using KLIPS, retired households are defined as partially retired households or entirely retired households. Partially retired households are people who decrease their labour hours dramatically but still remain in the labour market. Including these households, this paper can show a consumption change of retired households more precisely.

Using the empirical model in Bernheim et al(2001) this paper presents the discontinuity of consumption across wealth quartile. There exists a negative relation with wealth and the level of discontinuity. A less wealth is associated with a large consumption drop after retirement.

Moreover, the paper compares paid worker with self employment in terms of consumption change near retirement. This paper suggests that the discontinuity of consumption is largely associated with paid worker's consumption fall. Especially, there exists a substantial fall in quartile 2.

In section Ⅵ, this paper suggests that the expense of house management, food at home and culture decrease in quartile 1. These expenses are not related with work related consumption or substitute of leisure. In the lowest quartile, spend of basic items such as grocery or fee of electric and water is decreased as well as work related expenses. Moreover spending on culture is curtailed in quartile 1. Otherwise, the highest quartile decrease their consumption in work related expenses such as cloth and food away from home. Therefore, this paper suggests that a lower wealth quartile shows the consume behavior irrespective of life cycle theory framework. In other words, their saving might be insufficient or they may make a impulsive and inconsistent financial plan over their life. In contrary, a higher wealth quartile is likely to consume within life cycle framework so that they might save sufficiently or they are farsighted enough to prepare retirement.

In addition, this paper shows that retired households spend less than nonretired households using propensity score matching. The consumption of retired households is smaller than nonretired households across wealth quartile. Specifically, the second quartile and third of retired households spend less in expenses of work related consumption. Otherwise, the highest quartile spend less than nonretired households in education. Moreover, there is a decline of management of house in the lowest quartile and third quartile. If these facts are not derived by the reduction of house members or graduation of school, the retirement has effects on a consumption drop in basic items such as water, electricity and education. Therefore, an additional analysis about a change of the number of household's members and residence of offsprings who receive education should be needed in future work.

Features of Korea are that the price of house is remarkably high but the desire of ownership is strong and that parents are eager about their offsprings' education. These characteristics can be possible explanations about the discontinuity consumption in the lowest wealth quartile. As spending on private education or trying to buy house before retirement, households may save inadequately. To make this assertion be more reliable, I have to show in which households have consumed primarily before retirement and concern more about saving profile. Moreover, the paper can be more reasonable if it presents whether the consumption also falls when the head of household previously expect their retirement. If the consumption path shows the discontinuous drop even if they expect the retirement, a alternative theory which can explain this discontinuity should be considered instead of life cycle model.

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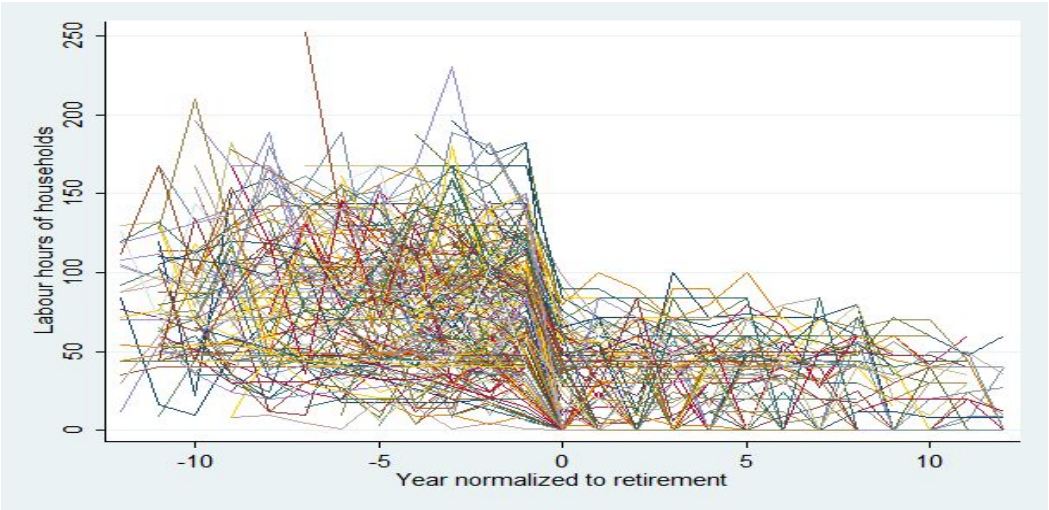
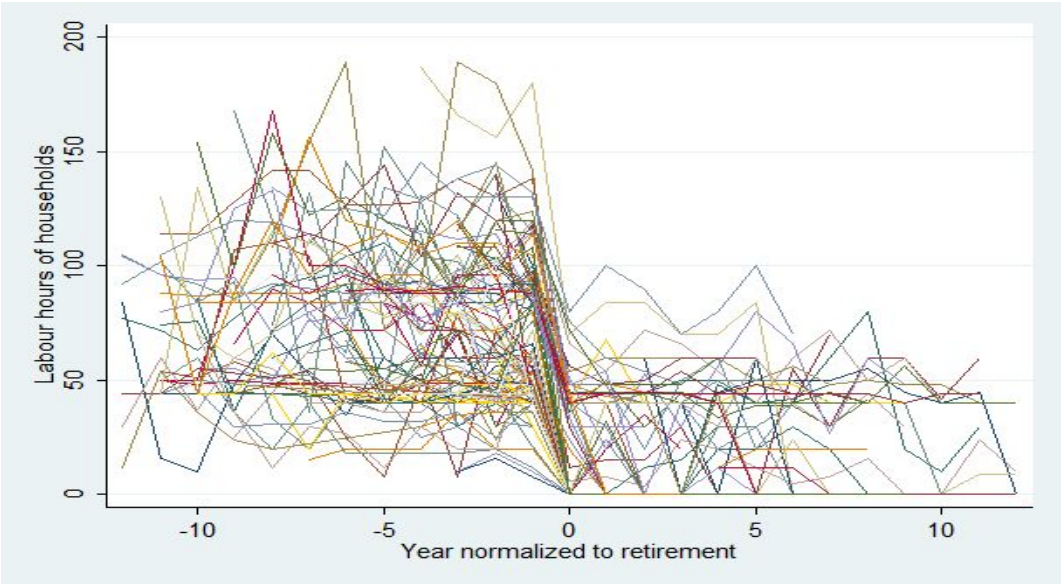
Appendix

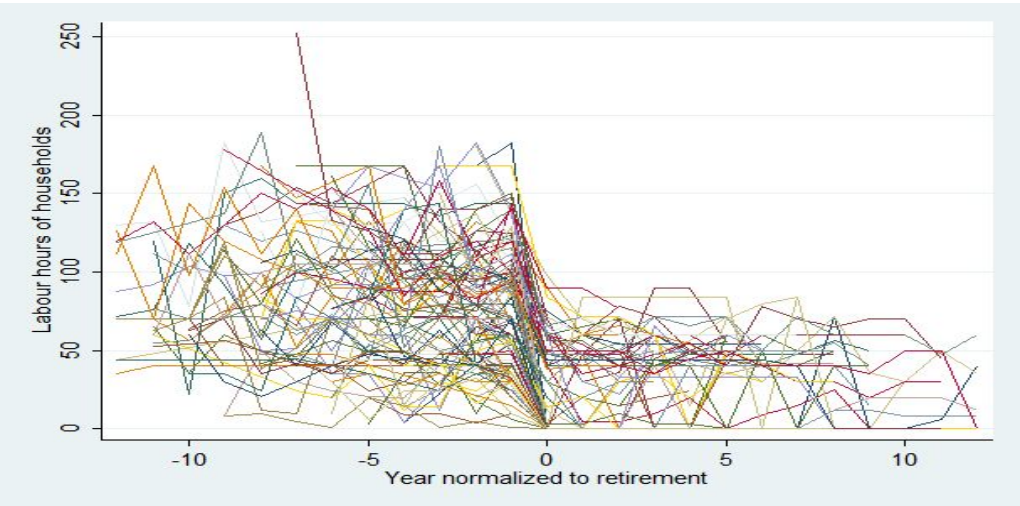
<Figure A> Labour Hours of Whole Retired Households



<Figure B> Labour Hours of Retired Paid Worker Households



<Figure C> Labour Hours of Retired Self Employment Households



국 문 초 록

평생주기가설에 따르면 가구들은 장기적인 안목을 가지고 소비평활화를 위해 저축을 한다. 따라서 이 이론은 은퇴 후의 소비감소를 개인의 선호, 예산제약 그리고 여가와 근로관련 지출의 선호에 의한 것으로 설명한다. 평생주기가설에 따라 개인들이 저축한 부와 소비가 실제로 체계적인 상관관계가 있는 지 살펴보는 것은 중요한 실증분석주제이다. KLIPS를 이용하여 평생주기가설과 반대로 소비와 부의 관계에 체계적인 관계가 거의 없음을 보였다. 부가 적은 가구일수록 소비의 불연속이 더욱 컸지만, 이는 근로관련 지출뿐만 아니라 여가보완재의 지출감소에서 기인하였다. 또한 은퇴가구들은 자산에 따라서도 비은퇴가구에 비해 소비수준이 낮았다. 따라서 이러한 결과들은 부가 적은 가구들은 저축을 불충분하게 했거나 근시안적인 재정적 의사결정을 했음을 제시한다.

주요어 : 은퇴소비퍼즐, 은퇴, 소비, 평생주기가설, KLIPS
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