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**The Effects of a Change in the Social Security Earnings Test on the
Japanese Elderly Male Labor Supply**

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The Effects of a Change in the Social Security Earnings Test on the Japanese Elderly Male Labor Supply*

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Abstract

This paper examines the effects of the elimination of a 20% cut in the pension for regular workers aged 60–64 years in 2005 on the supply of elderly Japanese labor. For data, we use the 2004 and 2007 Comprehensive Survey of Living Conditions. The estimation results indicate that the change increased the supply of male regular workers and decreased that of nonregular workers aged 60–64 years but did not increase the overall labor supply.

Keywords: Social security earnings test, Pension, Elderly labor supply

JEL Codes: J14 J22 H55

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1 Introduction

Japan's rapidly decreasing working-age population is thought to be responsible for reducing the country's economic growth. To address this issue, the Japanese government is aiming to increase the labor supply of the elderly. To encourage the elderly to work, the government has attempted to improve the earnings test rule for pensions several times because the earnings test leads to very high marginal tax rates for older workers, as pointed out in Baker and Benjamin (1999) and Friedberg (2000).

The aim of this paper is to clarify how a 2005 change in the earnings test rule for pensions, which eliminated the 20% cut to pensions for workers aged 60–64 years who needed to pay employee pension insurance, affected the elderly labor supply. The paper focuses not only on whether the elderly chose to work but also on their choice of work status (regular worker, nonregular worker, or unemployed). We also test whether the elderly increased their work hours.

To achieve this aim, the paper employs a difference-in-differences framework to estimate the work-status-choice and labor supply functions using the 2004 and 2007 Comprehensive Survey of Living Conditions. This corresponds with earlier work by Baker and Benjamin (1999) and Haider and Loughran (2008). The treated group comprises 62–64 year-old males affected by the change in the earnings test rule. The comparison group consists of 55–59 and 65–69 year-old males unaffected by the rule change during the period under study.

The empirical results are summarized as follows. First, there is no evidence that the change affected the choice of the elderly to work. Second, the change affected work status choice by increasing the probability of choosing regular worker (workers who must pay Employee's Pension Insurance) and decreasing the probability of choosing nonregular worker (workers who need not pay Employee's Pension Insurance). Finally, the change appeared not to affect overall work hours.

This paper has the following features compared with other studies on the effects of changes in earnings test rules, including Disney and Smith (2002) in the UK, Friedberg (2000), Song and Manchester (2007) in the US, Hernæs and Jia (2013) in Norway, and Baker and Benjamin (1999) in Canada. These studies focus on the elimination of the earnings test, which makes the budget constraint line pivot and shift, which means that the wage rate increases for some workers. Therefore, the *a priori* effect of the change in the earnings test on the labor supply is ambiguous: some workers may increase their supply of labor because the substitution effect dominates, whereas others may decrease their supply of labor because the income effect dominates. In contrast, the change in the earnings test rule that we address moves the budget constraint line up and parallel, and therefore does not induce a substitution effect, the *a priori* effects of the change are then clear.

Although some existing studies, including Higuchi and Yamamoto (2002) and Ishii and Kurosawa (2009), examine changes in the pension-earnings test in Japan, they do not consider the 2005 change, and the changes in the budget constraint line are then more complicated. Our study is based on the Comprehensive Survey of Living Conditions, which contains rich and detailed information about the income of other household members, which in turn may affect the labor supply behavior of elderly workers. Moreover, in this paper, the focus is not only on the choice of whether to work but also on the choice of work status. Yamada (2012) is one of the few studies that do address the 2005 change in the earnings test rule. Yamada (2012) uses the 2009 Survey of Elderly Employment (*Konenreisha no Koyou Syugyo no Jittai ni Kansuru Chosa* in Japanese) and suggests the possibility that a change in the earnings test rule, which involved a 20% cut in the pension in 2005, affected the labor supply of the elderly. We support Yamada (2012)'s finding and argue that this may be because more elderly chose to work as regular workers and accordingly pay Employee Pension Insurance.

The remainder of the paper is structured as follows. Section 2 explains the empirical model and describes the data. Section 3 presents the empirical results, and Section 4 provides some concluding remarks.

2 Empirical Model

We first briefly describe the Japanese pension system and the earnings test rule. There are two types of pension plan in Japan. All residents under 65 years (in 2017) in Japan must be enrolled in one of these pension programs. The first plan is Employee's Pension Insurance (*Kosei Nenkin*). Employees working at an establishment with more than five employees and regularly employed must be enrolled in this plan and pay pension insurance based on their wage earnings. The spouses of workers enrolled in Employee's Pension Insurance whose income is lower than a certain threshold are also insured but do not need to pay pension insurance. Other residents, including the self-employed aged under 65 years, must be enrolled in the National Pension (*Kokumin Nenkin*) and pay for pension insurance regardless of their earnings (16,260 yen per month in 2016). This is usually lower than the amount payable under Employee's Pension Insurance. The pension benefits of the National Pension program are also usually much lower than those of the Employee's Pension Insurance program. Those insured by both pension programs who continue to pay for pension insurance over a certain period (40 years) can receive pension benefits according to the insurance premium paid when they reach a certain age (65 years in 2007). The pension benefit does not increase once the paying periods exceed this period. However, if the person's age does not exceed 65 years, they are still obliged to pay pension insurance.

However, pension benefits are reduced if the person works and receives a certain level of earnings¹. This is the

¹These "earnings" include labor earnings plus the pension. Other income, such as financial income, is not included.

so-called *Zaishoku-Rourei-Nenkin* (earnings test rule). Over the years, the earnings test rule has changed several times in Japan. However, we focus on the earnings test rule change in 2005. From 1994 to 2004, the pension benefit for “regular workers” (workers who must pay Employee’s Pension Insurance) aged 60–64 years was cut by 20% regardless of earnings. In addition, if the wages plus pension benefit of a regular worker exceeded a certain level (which varied by year but was 220 thousand yen in 1994), the pension benefit for the worker was reduced by 1 yen for every 2 yen that the worker earned. If the worker’s earnings exceeded another certain level (which again varied by year but was 340 thousand yen in 1994), the pension benefit for the worker was reduced by 1 yen for every 1 yen that the worker earned. A similar earnings test rule for regular workers aged 65–69 years was introduced in 2000 but without the 20% pension cut.

Employees who are not regular workers are unaffected by the earnings test rule. One of the most important criteria whereby an employee is considered a “regular worker” is the number of work hours. If the time that the person is contracted to work exceeds three-quarters of the hours of an equivalent full-time worker, he or she is considered to be a regular worker and then must pay Employee’s Pension Insurance and face the earnings test rule. Until 2005, the pension benefits for regular workers aged 60–64 years were cut by 20 percent. After 2005, this cut was removed.

Figure 1 depicts the budget constraint between leisure and consumption for elderly persons aged 60–64 years. As shown, the removal of the 20% pension cut in 2005 does not involve a substitution effect, with the budget constraint before the change depicted with a solid line and the constraint after the change depicted with a dashed line. The removal of the pension cut then merely involves a parallel upward shift in the budget constraint.

For the budget constraints in Figure 1, a person choosing not to work would maximize his utility at point A. The change in the earnings test rule would not affect him because it does not alter the budget constraint faced. This implies that the change also does not affect the choice to work.

In contrast, a person who had chosen point B (as a corner solution) would work as a regular worker and would choose, say, point C, because the change alters the budget constraint faced given the change in the rule. This implies that the change in the rule will affect work status choice in that some workers who had chosen to be nonregular workers would now work as regular workers. Thus, the number of regular workers would increase and the number of nonregular workers would decrease.

In contrast, a person choosing point D would choose a point on the upper right, say, E, which infers that he reduces the hours worked because of the change in the rule. This is because the relative price of earnings is not affected by the change, and as leisure is a normal good, its consumption will increase (alongside a corresponding decrease in the hours of work). We should note that overtime work is not uncommon in Japan. However, workers

may not freely choose their hours of work conditional on wages (for example, a tied wages-hours offer; see Lundberg (1985) for an analysis).

In summary, the change in the earnings test rule would not affect the choice of working or not but would increase the number of regular workers and decrease the number of nonregular workers. The change in rules may decrease the number of work hours. However, because overtime work is not uncommon among Japanese workers, they may not freely choose their hours of work. We should also note that the cost of the change in the rule was not negligible (average pension benefits are 185,020 yen per month, and there were about 3 million persons aged 60–64 years in Japan in 2004.). It is then important to know whether the number of regular workers increased in response to the change and whether the overall labor supply increased or decreased.

To utilize the removal of the 20% cut in the pension benefit for regular workers aged 60–64 years, we employ a difference-in-differences framework as in Haider and Loughran (2008) to examine the effect on the labor supply of the elderly using data from the Comprehensive Survey of Living Conditions (CSLC). Selected individuals are obliged to fill in the questionnaire under the Fundamental Statistics Act. The CSLC is compiled annually by Japan’s Ministry of Health, Labor and Welfare. In addition, large-scale surveys are conducted every three years. Because detailed information available only in the large-scale surveys are necessary when analyzing labor supply behavior, we are restricted to the Comprehensive Survey of Living Conditions in 2004 and 2007. Along with males aged 60–64 years, we include males aged 55–59 and 65–69 years as comparison groups because they did not face any change in the earnings test rule in the period that we analyze. We exclude the self-employed because they were not affected and because their labor supply behavior differs from other employees.²

Problematically, not all people aged 60–64 years can be included in the treated group because the mandatory retirement system also changed in this period. Japanese firms have been legally prohibited from setting a mandatory retirement age below 60 years since 1998. However, with the increase in the eligibility age for the employee pension, Japanese firms since 2004 are legally obliged to secure employment for workers until they reach the eligibility age. The eligibility age was 60 years in 2004 and 62 years in 2007. Kondo and Shigeoka (2015) show that there are differences in employment behavior between elderly males born after April 1946 (61 years or younger in 2007) and elderly males born before March 1946 (62 years or older in 2007). Hence, in this paper, we include males aged 62–64 years in the treated group.

We estimate the following two models using samples of 62–64-year-old males (the treated group) alongside control groups of 55–59- and 65–69-year-old males, by specifying the following three variables. First, *Treated* is a dummy variable indicating whether person i is aged 62–64 years ($Treated=1$) or not (65–69 or 55–59 years $Treated=0$).

²We also exclude females because there were relatively few female regular workers aged 60–69 years in Japan during this period.

Second, *Year* is a dummy variable indicating whether the year is 2007 (*Year*=1) or not 2004 (*Year*=0). Third, *YearTreat* is a cross-term of these two variables. Ai and Norton (2003) demonstrates that the signs of the estimated coefficients for cross-terms in nonlinear functions do not necessarily provide the marginal effects. For this reason, we focus on comparing the average marginal effects of the treated dummy between 2004 and 2007.

The following work status choice function is estimated using a multinomial logit model.

$$P_i = X_i\delta + \nu_i, \quad (1)$$

where P_i is the choice of work status, where work status is defined as workers who must pay Employee's Pension Insurance (Regular workers), workers who do not pay Employee's Pension Insurance (Nonregular workers) or nonworkers.

Second, the following labor supply function is estimated using Tobit.

$$Y_i^* = F(X_i\beta + \epsilon_i), \quad (2)$$

$$\begin{cases} Y = Y^* & \text{if } Y^* > 0 \\ Y = 0 & \text{otherwise} \end{cases} \quad (3)$$

where Y is hours worked in a week.

The explanatory variables, X , comprise total household savings, total household loans, the total income of other household members, a person's age and age squared, the amount of any corporate pension paid to the person, the number of household members, the number of household members who need help, the number of workers in the household (excluding the individual), a dummy variable indicate whether he needs help, a dummy variable indicate whether he is with spouse, prefectural unemployment rate, and nonlabor income (excluding pension benefits). Table 1 provides selected descriptive statistics.

3 Results

Tables 2 to 4 summarize the estimation results. Table 2 shows the results for the work status function for males aged 62–69 years. The results are generally consistent with our theoretical predictions, although some of the estimated coefficients for household savings and loans have the incorrect sign but are statistically significant at the 5 percent level. One possible reason is that the 2004 and 2007 Comprehensive Survey of Living Conditions did not include information about educational level, which may be important for labor supply decisions. The coefficients for savings and loans may capture this effect. The difference in the marginal effects for the treated dummy between *Year*=2004 and that in *Year*=2007 is negative and significant at the 5% level for nonregular workers, and positive and significant

at the 5% level for regular workers. This suggests that the change in the earnings test rule increased the number of elderly males (aged 62–64 years) choosing to work as regular workers and decreased the number of elderly males (aged 62–64 years) choosing to work as nonregular workers, as the theory predicted. In contrast, the difference in the marginal effects for the treated dummy between Year=2004 and that in Year=2007 is not significant at the 5% level for non-workers. Hence, the change seemed not to affect the labor participation decision of elderly males.

Table 3 provides the results for the sample of males aged 55–59 and 62–64 years. The difference in the marginal effects of the treated dummy between Year=2004 and that in Year=2007 is negative and significant at the 10% level for nonregular workers, and positive and significant at the 5% level for regular workers. This is consistent with the results for the sample aged 62–69 years and also shows that the change affected the work status choice of elderly males aged 62–64 years. Table 4 details the results for the samples aged 55–59 and 65–69 years, both of which were unaffected by the change in the earnings test rule. The difference in the marginal effects of the treated dummy between Year=2004 and that in Year=2007 is not significant and suggests that these samples satisfy the common trends assumption.

Table 5 provides the results for the estimation of the labor supply (work hours) function. The difference in predicted work hours from the marginal effects of the treated dummy between Year=2004 and that in Year=2007 is not statistically significant. This suggests that the change in the earnings test rule did not increase the overall labor supply of elderly males aged 62–64 years. However, because the change in the rule increased the number of regular workers aged 62–64 years, and because these work for longer hours than nonregular workers, according to the results in Tables 2 to 3, there must be regular workers who decreased their labor supply. If the overall labor supply did not increase, this implies that the change in the rule induced regular workers to decrease their labor supply by ceasing overtime work, likely as a result of the income effect and a decrease in the increment of offsetting labor supply by new regular workers.

4 Conclusion

This paper investigates how a change in the Japanese earnings test rule in 2005 affected the elderly and whether this change encouraged them to work or not using the 2004 and 2007 Comprehensive Survey of Living Conditions. To evaluate the change, we focused not only on the choice of the elderly whether to work or not but also on the choice of work status. In addition, we analyzed whether the change in rule affected the work hours of the elderly.

The estimation results are summarized as follows. First, there is no evidence that the change in the earnings test rule affected the labor participation decision of elderly males. Second, the estimation results also imply that

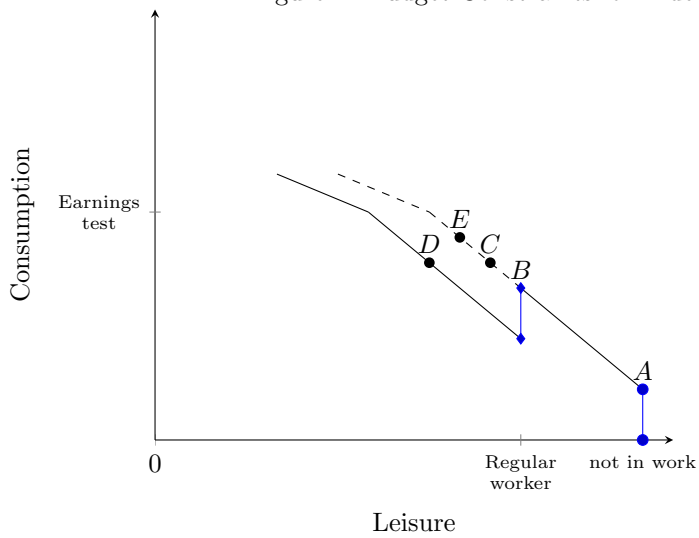
the change in the earnings test rule affected how elderly males work, with more elderly males working as regular workers paying Employee's Pension Insurance and fewer working as nonregular workers paying no Employee's Pension Insurance given the change in the earnings test rule. Third, the change in the earnings test rule did not increase the overall work hours of elderly males, although it did affect their choice of being regular or nonregular workers. This could be because regular workers ceased or at least decreased their hours of overtime work because the removal of the 20% cut in their pension benefit induced them to work less given the income effect with the decrease offset by the increase in the labor supply of new regular workers.

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Figure 1: Budget Constraints for Elderly Employees (aged 60–64 years)



Notes: (1) The solid (dashed) line is the budget constraint before (after) the 2005 rule change.

Table 1: Descriptive Statistics

	55-59		62-64		65-69	
	2004	2007	2004	2007	2004	2007
Household savings	13.95 (29.48)	14.63 (29.26)	15.49 (20.66)	16.30 (21.56)	15.81 (41.69)	15.42 (27.92)
Household loans	4.17 (10.27)	3.68 (8.23)	1.93 (6.79)	1.84 (7.29)	1.68 (7.43)	2.03 (7.46)
Firm pension	0.02 (0.17)	0.01 (0.16)	0.22 (0.64)	0.23 (0.58)	0.13 (0.47)	0.19 (0.62)
Household income (other than the individual)	2.81 (3.09)	2.47 (3.00)	2.12 (2.77)	1.97 (2.71)	2.17 (2.87)	1.84 (2.68)
# of household	3.19 (1.34)	3.10 (1.35)	2.70 (1.21)	2.77 (1.28)	2.75 (1.42)	2.63 (1.24)
Yearly income (other than income from work and pension)	0.18 (0.84)	0.19 (1.46)	0.20 (0.78)	0.16 (0.64)	0.16 (1.05)	0.20 (1.00)
=1 if he is with spouse	0.85 (0.36)	0.82 (0.38)	0.90 (0.30)	0.87 (0.34)	0.90 (0.30)	0.88 (0.33)
=1 if he needs help	0.01 (0.09)	0.02 (0.14)	0.02 (0.13)	0.04 (0.19)	0.04 (0.20)	0.04 (0.20)
# of workers in household	1.18 (1.02)	1.09 (1.00)	0.74 (0.88)	0.78 (0.87)	0.61 (0.83)	0.66 (0.82)
# of individuals who need help	0.10 (0.30)	0.14 (0.37)	0.06 (0.25)	0.14 (0.36)	0.06 (0.24)	0.10 (0.31)
Unemployment rate	4.46 (0.94)	3.71 (0.95)	4.46 (0.95)	3.65 (0.92)	4.49 (0.94)	3.72 (0.97)

Notes:

- (1) Source: Comprehensive Survey of Living Conditions in 2004 and 2007.
- (2) Standard errors in parentheses.

Table 2: Estimation Results of Work Status Function, 62–64 and 65–69 years

	Don't work	Nonregular worker	Regular worker
household savings	-0.0004** (0.0002)	0.0001 (0.0002)	0.0003*** (0.0001)
household loans	-0.0037*** (0.0010)	0.0021*** (0.0008)	0.0016*** (0.0005)
firm pension	0.0617*** (0.0141)	-0.0461*** (0.0134)	-0.0156* (0.0095)
household income (other than the individual)	0.0091*** (0.0035)	-0.0099*** (0.0032)	0.0008 (0.0021)
# in household	0.0237*** (0.0084)	-0.0123 (0.0075)	-0.0115** (0.0057)
yearly income (other than income from work and pension)	-0.0026 (0.0074)	0.0022 (0.0066)	0.0004 (0.0050)
=1 if he is with spouse	-0.0858*** (0.0248)	0.0370* (0.0224)	0.0488*** (0.0185)
=1 if he needs help	0.3064*** (0.0568)	-0.2102*** (0.0561)	-0.0962** (0.0425)
# of workers in household	-0.1047*** (0.0123)	0.0774*** (0.0110)	0.0274*** (0.0082)
# of individuals who need help	0.0064 (0.0254)	-0.0032 (0.0229)	-0.0031 (0.0165)
unemployment rate	0.0293*** (0.0075)	-0.0278*** (0.0069)	-0.0015 (0.0050)
age	0.1915 (0.2448)	-0.0698 (0.2151)	-0.1217 (0.1623)
agesq	-0.0012 (0.0018)	0.0004 (0.0016)	0.0008 (0.0012)
1 if treated	-0.0082 (0.0312)	0.0143 (0.0279)	-0.0061 (0.0206)
1 if 2007	-0.0522*** (0.0154)	-0.0273** (0.0137)	0.0794*** (0.0104)
Marginal Effect of Treated Dummy (at year=2004)	-0.0134 (0.0349)	0.0574* (0.0332)	-0.0440*** (0.0165)
Marginal Effect of Treated Dummy (at year=2007)	-0.0058 (0.0352)	-0.0274 (0.0283)	0.0332 (0.0289)
Difference	0.0076 (0.0495)	-0.0848* (0.0436)	0.0772** (0.0333)
Obs		4080	

Notes:

- (1) Estimation method is multinomial logit model. This table reports the average marginal effects.
- (2) Standard errors in parentheses.
- (3) *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.
- (4) Year dum =1 is year =2007 (after the change of rules).
- (5) Treated dum =1 are persons aged 62–64 years (affected by change of rules).

Table 3: Estimation Results of Work Status Function, 55–59 and 62–64 years

	Don't work	Nonregular worker	Regular worker
household savings	-0.0011*** (0.0003)	-0.0008*** (0.0003)	0.0019*** (0.0003)
household loans	-0.0056*** (0.0010)	0.0016** (0.0006)	0.0039*** (0.0008)
firm pension	0.0714*** (0.0134)	-0.0267* (0.0156)	-0.0447** (0.0192)
household income (other than the individual)	0.0103*** (0.0025)	-0.0040* (0.0023)	-0.0063*** (0.0024)
# in household	-0.0016 (0.0062)	-0.0020 (0.0057)	0.0036 (0.0061)
yearly income (other than income from work and pension)	0.0220*** (0.0050)	0.0107** (0.0054)	-0.0327*** (0.0054)
=1 if he is with spouse	-0.1237*** (0.0143)	-0.0350** (0.0143)	0.1587*** (0.0149)
=1 if he needs help	0.3480*** (0.0367)	0.0229 (0.0436)	-0.3709*** (0.0535)
# of workers in household	-0.0376*** (0.0087)	0.0297*** (0.0078)	0.0079 (0.0085)
# of individuals who need help	0.0216 (0.0167)	-0.0194 (0.0169)	-0.0022 (0.0169)
unemployment rate	0.0196*** (0.0053)	-0.0020 (0.0051)	-0.0176*** (0.0056)
age	-0.2592** (0.1083)	0.0243 (0.1015)	0.2350* (0.1355)
agesq	0.0024*** (0.0009)	-0.0002 (0.0009)	-0.0022* (0.0012)
1 if treated	0.1715*** (0.0501)	0.2570*** (0.0539)	-0.4285*** (0.0624)
1 if 2007	-0.0279** (0.0112)	-0.0499*** (0.0105)	0.0779*** (0.0116)
Marginal Effect of Treated Dummy (at year=2004)	0.2053*** (0.0548)	0.3259*** (0.0598)	-0.5312*** (0.0559)
Marginal Effect of Treated Dummy (at year=2007)	0.1383*** (0.0503)	0.1916*** (0.0532)	-0.3300*** (0.0737)
Difference	-0.0670 (0.0744)	-0.1343* (0.0801)	0.2013** (0.0925)
Obs		4933	

Notes:

- (1) Estimation method is multinomial logit model. This table reports The average marginal effects.
- (2) Standard errors in parentheses.
- (3) *, **, and *** denotes significance at the 10%, 5%, and 1% level, respectively.
- (4) Year dum=1 is year=2007 (after the change of rules).
- (5) Treated dum=1 are persons aged 62–64 years (affected by change of rules).

Table 4: Estimation Results of Work Status Function, 55–59 and 65–69 years

	Don't work	Nonregular worker	Regular worker
household savings	-0.0004** (0.0002)	-0.0004* (0.0002)	0.0008*** (0.0002)
household loans	-0.0042*** (0.0007)	0.0012** (0.0005)	0.0030*** (0.0006)
firm pension	0.0310*** (0.0121)	0.0084 (0.0107)	-0.0394** (0.0157)
household income (other than the individual)	0.0078*** (0.0022)	-0.0059*** (0.0020)	-0.0019 (0.0019)
# in household	0.0103* (0.0053)	-0.0070 (0.0048)	-0.0032 (0.0049)
yearly income (other than income from work and pension)	0.0114*** (0.0039)	0.0058 (0.0039)	-0.0172*** (0.0038)
=1 if he is with spouse	-0.1059*** (0.0136)	-0.0328*** (0.0125)	0.1387*** (0.0125)
=1 if he needs help	0.3116*** (0.0331)	-0.0532 (0.0372)	-0.2584*** (0.0391)
# of workers in household	-0.0527*** (0.0079)	0.0415*** (0.0069)	0.0112 (0.0070)
# of individuals who need help	0.0143 (0.0159)	-0.0157 (0.0152)	0.0014 (0.0142)
unemployment rate	0.0247*** (0.0048)	-0.0093** (0.0045)	-0.0154*** (0.0046)
age	-0.0331 (0.0454)	0.0299 (0.0410)	0.0032 (0.0423)
agesq	0.0004 (0.0004)	-0.0003 (0.0003)	-0.0001 (0.0004)
1 if treated	0.3269*** (0.0605)	0.1587*** (0.0485)	-0.4856*** (0.0604)
1 if 2007	-0.0252** (0.0101)	-0.0163* (0.0092)	0.0415*** (0.0095)
Marginal Effect of Treated Dummy (at year=2004)	0.3471*** (0.0636)	0.1382*** (0.0526)	-0.4853*** (0.0607)
Marginal Effect of Treated Dummy (at year=2007)	0.3078*** (0.0601)	0.1790*** (0.0468)	-0.4868*** (0.0629)
Difference	-0.0393 (0.0875)	0.0408 (0.0705)	-0.0015 (0.0874)
Obs		6241	

Notes:

- (1) Estimation method is multinomial logit model. This table reports the average marginal effects.
- (2) Standard errors in parentheses.
- (3) *, **, and *** denotes significance at the 10%, 5%, and 1% level, respectively.
- (4) Year dum=1 is year=2007 (after the change of rules).
- (5) Treated dum=1 are persons aged 65–69 years.

Table 5: Estimation Results of Work Hours Function

	55–59 vs. 62–64	62–64 vs. 65–59	55–59 vs. 65–69
household savings	0.0315** (0.0140)	0.0710*** (0.0246)	0.0394*** (0.0111)
household loans	0.2063*** (0.0389)	0.4677*** (0.1014)	0.2216*** (0.0388)
firm pension	-8.4032*** (1.1873)	-7.7329*** (1.5689)	-3.3845*** (1.0314)
household income (other than the individual)	-0.4712*** (0.1517)	-0.8338** (0.3921)	-0.3533** (0.1495)
# in household	0.4626 (0.3852)	-2.8182*** (0.9632)	-0.2145 (0.3792)
yearly income (other than income from work and pension)	-0.7995** (0.3455)	0.3593 (0.8742)	-0.7042** (0.3251)
=1 if he is with spouse	9.2981*** (1.0854)	9.5362*** (2.8477)	8.2213*** (1.0928)
=1 if he needs help	-38.5412*** (3.3344)	-34.4649*** (5.8573)	-32.7391*** (3.0338)
# of workers in household	1.9892*** (0.5316)	12.0637*** (1.4634)	2.9933*** (0.5385)
# of individuals who need help	-1.9140* (1.0888)	-0.8096 (2.9142)	-0.9679 (1.1112)
unemployment rate	-0.9397** (0.3708)	-2.3043*** (0.8704)	-1.6149*** (0.3686)
age	35.3790*** (8.4363)	-27.2247 (28.0887)	7.1417** (3.1353)
agesq	-0.3188*** (0.0733)	0.1771 (0.2117)	-0.0714*** (0.0259)
1 if treated	-15.8966*** (2.8949)	1.2397 (4.0771)	-30.4850*** (2.8512)
1 if 2007	1.3512 (0.8468)	5.9057*** (2.1762)	0.8220 (0.8980)
cross term	3.8762** (1.6224)	0.2322 (3.3253)	3.6090** (1.4559)
constant	-948.5716*** (242.9785)	1003.9690 (931.4644)	-139.3497 (94.9702)
σ	23.1469*** (0.2888)	41.6016*** (0.9630)	24.7429*** (0.3086)
Marginal Effect of Treated Dummy (at year=2004)	-13.1309*** (2.3370)	0.3872 (1.2786)	-21.1266*** (1.9420)
Marginal Effect of Treated Dummy (at year=2007)	-10.2944*** (2.4805)	0.5326 (1.4018)	-19.5076*** (1.9722)
Difference	2.8365 (3.4079)	0.1454 (1.8973)	1.6190 (2.7678)
Obs	4156	4933	6249

Notes:

- (1) Estimation method is Tobit.
- (2) Standard errors are in parentheses.
- (3) *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.
- (4) Year dum=1 is year=2007 (after the change of rules).
- (5) Treated dum=1 are persons aged 62–64 years for 62–64 vs. 65–59 and 55–59 vs. 62–64 cases. For 55–59 vs. 65–69 cases, Treated dum=1 are persons aged 65–69 years.