



RIETI Discussion Paper Series 11-E-065

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### Abstract

Using the Japanese Study of Aging and Retirement (JSTAR), a Japanese panel survey of people age 50 or older, we find that many Japanese in their early 50s—compared to those in their late 50s and early 60s—expect their level of public pension benefits to decline. We find that recent pension reform (which raised the pensionable age) affected people by increasing the age when they expect to claim their benefits by almost the exact amount for all. Nevertheless, the effect of reform on their expectations for future benefits remained insignificant. We also find evidence that anxiety about the public pension program's future induces people to save more.

*Keywords:* subjective expectations, uncertainty, savings, and pension reform.

*JEL Classification:* E21; H55

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For helpful comments received, we thank Mitsuhide Hoshino, Hidehiko Ichimura, Masayuki Morikawa, Jim Smith, and participants that attended the meeting held at RIETI on March 23, 2011 and the RIETI-RAND Workshop held on July 30, 2011.

## 1. Introduction

In Japan's rapidly aging society, as a large wave of the baby-boomer generation is reaching retirement age, the public pension program faces financial challenges that threaten the program's solvency and benefits for future generations. To cope with the overall increase in benefits and the deteriorating fiscal balances, the Japanese government pursued pension reforms that raise the pensionable age from 60 to 65, and introduced an automatic adjustment of their benefit levels to allow the pension to adapt flexibly to demographic and macroeconomic changes. These reforms may affect non-retirees' expectations about the quality of future public pension arrangements and, as a consequence, alter their savings, asset holdings, and labor supply decisions. For example, non-retirees may expect further delays in their pensionable age and/or reductions in their future benefit level.<sup>1</sup> They may, therefore, decide to delay retirement and save more for retirement.

The purpose of this paper is first to investigate the effect of the pension reforms on the non-retirees expectations about their future public pension. This paper also examine whether the loss of confidence in the future public pension system induces individuals to save more for retirement. In other words, we examine the substitution effect of changes in the public pension on private savings.

Due to lack of data on pension expectations, there is almost no empirical study in Japan that examines the relationships between individuals' subjective expectations of the future public pension and their decisions on savings and how long they plan to work. We utilize the Japanese Study of Aging and Retirement (JSTAR), a new Japanese panel survey that collects information on the economic, social, and health conditions of people age 50 or older. One of the unique characteristics of the JSTAR is that the survey questions respondents about their subjective

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<sup>1</sup> Since the pension benefit and contribution schemes are required by law to be reviewed at least every five years from the viewpoint of financial balances and their sustainability, non-retirees may fear that the scheme may worsen.

probabilistic expectations of public pension benefits. By utilizing this information, we can measure the degree of uncertainty about public pension benefits for each respondent.<sup>2</sup>

Many studies report that middle-aged and older adults save excessively when compared to the amounts given in the life cycle hypothesis. Kotlikoff and Summers (1989) and De Nardi, French, and Jones (2009, 2010) show that middle-aged and older adults save a large amount for the following reasons: to leave a bequest to their children, to pay for expensive medical care, and to prepare for a longer life expectancy. In Japan, in addition to these motives, it has been pointed out by Horioka, Fujisaki, Watanabe, and Kouno (2000) and Horioka, Suzuki, and Hatta (2007) that the individuals' perceptions that public pensions could become more unreliable are an important factors in explaining the high saving in Japan. The Economic Survey of Japan (2009) has used cross-country data to find a negative relationship between the household saving rate and the proportion of individuals reporting confidence about the future of their public pension. However, this prediction has not been tested based on individual data that have as rich demographic and economic information as the JSTAR. Furthermore, recent public pension reform may weaken the individuals' confidence in the future public pension system and affect their savings decisions. However, this reform effect has not been explored yet.<sup>3</sup>

The Japanese pension reforms in 1994 and 2000 raised the pensionable age of the Employee Pension Insurance (EPI) gradually from 60 to 65 years of age (see Table 1). The EPI benefits consist of a flat-rate part and a wage-proportional part. For men, the pensionable age of the flat-rate benefit of the EPI is being raised by one year every three years from 2001 to 2013 until the age of 65 is reached. The pensionable age for the wage-proportional benefit of the EPI

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<sup>2</sup> Dominitz and Manski (2006) elicit the subjective probability distribution of benefits from the respondents to measure the uncertainty of pension benefits.

<sup>3</sup> Dominitz, Manski, and Heinz (2002) simulate how social security policy may affect retirement savings. Delavande and Rohwedder (2011) estimate the relationship between the respondents' uncertainty about their social security policy and their portfolio choice of risky and safe assets.

will then be increased by one year every three years from 2013 to 2025 until 65 years of age is reached. From 2005 to 2030, the pensionable age for women will increase in a parallel manner to that of men, but will lag by 5 years. Since the gradual increase in the pensionable age is based on birth cohorts (two or four consecutive cohorts having the identical pensionable age), we can exploit this policy variation to identify the effects of pension expectations on work and savings decisions.

In Section 2, we review recent public pension reform and elderly employment policy in Japan. Section 3 describes the JSTAR data. Section 4 presents the distribution of public pension expectations conditional on the birth cohort. Section 5 examines the effect of the socio-economic characteristics on public pension expectations and also studies the effect of public pension reform on pension expectations. Section 6 provides estimates on the effects of public pension expectations on savings decisions. Section 7 concludes the paper.

## **2. Overview of Reform on Public Pension and Elderly Employment Policy in Japan**

The public old-age pension scheme in Japan is composed of three plans: (1) National Pension Insurance (NPI, *Kokumin Nenkin*) for self-employed workers and non-employed people; (2) Employees' Pension Insurance (EPI, *Kosei Nenkin*) for those employed by private business corporations; and (3) Mutual Aid Insurance (MAI, *Kyosai Nenkin*) for those employed in the public sector and private schools. The NPI, EPI, and MAI cover 45.5, 48.0, and 6.5 percent of the population insured by public pension programs in 2007, respectively (Oshio, Shimizutani, Oishi; 2010, 2011). Since the MAI has almost the same benefit scheme as the EPI, the MAI and the EPI are combined in the JSTAR questionnaire. The NPI consists only of a flat-rate benefit (the so called Old-Age Basic Pension, *Rorei Kiso Nenkin*), but the EPI consists of a two-tier benefit scheme: flat-rate and wage-proportional benefits. To be eligible to receive the public pension in Japan, one must pay a monthly premium into the plan for a minimum of 25 years. Dependent

spouses of the EPI and MAI beneficiaries are entitled to the flat-rate benefit without paying contributions if their income is below the minimum taxable income.<sup>4</sup>

The pensionable age for the flat-rate NPI is 65 in principle.<sup>5</sup> On the other hand, the pensionable age for the flat-rate EPI had been set at age 60 since 1975 for men and since 2000 for women. However, pension reforms in 1994 and 2000 raised the pensionable age for the EPI's flat-rate and wage-proportional benefits in stages from age 60 to 65 as presented in Table 1, Panel A. For male EPI beneficiaries, the pensionable age is raised in the following two stages: In the first stage, the pensionable age for the flat-rate EPI has been raised by one year for every three years from 2001 until 2013 to reach age 65. In the second stage, the pensionable age for the wage-proportional EPI will be raised by one year every three years beginning from 2013, and reaching 65 in 2025. For female EPI beneficiaries, the pensionable age will be increased with a lag of 5 years relative to men: i.e., the pensionable age for female EPI beneficiaries will be raised from 60 to 65, starting from 2006 until 2013 for the flat-rate benefit, and from 2018 until 2030 for the wage-proportional benefit.

To provide stable employment for adults in their early 60s, who will no longer be eligible for the flat-rate EPI, the government passed the Employment Measures Law in 2004. This Law requires companies to ensure employment up to the pensionable age, and thus obligates companies to gradually raise the mandatory retirement age or to introduce a continued employment system from age 60 to age 65 by 2013 (as in Table 1, Panel B), or to completely abolish mandatory retirement.

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<sup>4</sup> Until 1986, the employees' dependent spouses either contributed voluntarily to the NPI or were simply left uninsured (except for a survivors' benefit). The 1986 reform put the dependent spouses under the public pension umbrella, although they were exempt from contributing to public pension plans.

<sup>5</sup> The NPI beneficiaries can opt to receive pension at any time after age 60. The pension amount varies by the claiming age; it is reduced when received before 65 and increased when received after 65.

In the following sections, we examine whether these policy reforms have affected the non-retirees' expectations about the public pension claiming age, benefit level, retirement, and savings decisions.

### **3. Data and Descriptive Statistics**

Data used in this study are the Japanese Study of Aging and Retirement (JSTAR), which is designed and carried out jointly by the Research Institute of Economy, Trade, and Industry (RIETI), Hitotsubashi University, and the University of Tokyo. The JSTAR is Japan's first globally comparable panel data survey of the elderly. Its design is similar to the U.S. Health and Retirement Study (HRS), the Survey of Health, Ageing and Retirement in Europe (SHARE), and the English Longitudinal Study of Ageing (ELSA). The JSTAR covers a wide range of information including: economic, social, and health conditions of middle-aged and older adults.

The individuals in the baseline sample of JSTAR were between the ages of 50 and 75 in 2007 and lived in five municipalities in eastern Japan: Takikawa City in Hokkaido; Sendai City in the Tohoku area; Adachi Ward, which is a special city in the center of the Tokyo metropolis; Kanazawa City in the Hokuriku area; and Shirakawa town, which is located in the mountains of Chubu area. Naha City, located in Okinawa, was added to the sample in 2008; and Tosu City, located in the Kyushu area, was added in 2009.<sup>6</sup> The sample had 5,800 participants in the sample participated in the survey and the response rate was close to 60 percent. The second wave of surveys was conducted in 2009 for the baseline sample. A more detailed description of the survey's design and sample is contained in Ichimura, Hashimoto, and Shimizutani (2009).

We have restricted the JSTAR data to respondents between the ages of 50 and 65 who were not currently receiving public pension benefits. At the time of the interview, 2,355

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<sup>6</sup> The JSTAR is not a probabilistic national sampling, but seven cities selected for probabilistic sample for each site.

individuals responding to the first wave of the JSTAR (5 municipalities, Naha, and Tosu) reported that they were not receiving public pension benefits at the time of the interview, and 2,002 individuals indicated that they would be utilizing public pension benefits in the future. Of those, 8.41 percent reported that the amount of their expected future public pension benefits would *not* be reduced; 35.05 percent reported that their expected benefits would be reduced; and the remaining 56.55 percent reported that they did not know. It appears that many non-retirees are uncertain about the amount of their expected future public pension benefits.

Table 2 gives the characteristics of our sample. Among those who plan to receive public pension benefits in the future, the average age is 56.7, 48.6 percent are female, 85.2 percent are married, and 84.3 percent are working for pay. In terms of education, 15.5 percent received less than a high-school degree, 45.7 percent received a high-school degree, 18.0 percent attained a junior college degree, and 20.6 percent earned a university degree or greater.

#### **4. Expectations on Public Pension Benefits: Empirical Findings**

In this section, we provide our findings on the expectations about the public pension claiming age, retirement age, future public pension benefit level, and the drop in the future public pension benefit level, conditional on birth cohorts. We find that the beliefs about the future of the public pension program demonstrate substantial uncertainty and heterogeneity.

##### **4.1. Expectations about the Public Pension Claiming Age and the Retirement Age**

We start by displaying the probability of the expected pension claiming age, conditional on fiscal year birth cohort, separately by the NPI and the EPI beneficiaries. We examine (1) whether there are noticeable differences in expected pension claiming age between the younger and the older cohorts, and (2) whether the expected pension claiming age differs across cohorts with different pensionable age for the EPI beneficiaries. We conduct the same analysis for the expected retirement age.



Figure 1 displays the probability of the expected public pension-claiming age, conditional on fiscal year birth cohorts, separately by gender and by type of pension individuals are planning to receive.<sup>7</sup> The sample includes five municipalities in 2007, Naha in 2008, and Tosu in 2009. For men and women planning to receive the NPI, 26.8 percent of those born after 1952 did not know about when they would claim their pension, while 55.8 percent expected to begin receiving benefits at age 65. For those born before 1951, 14.6 percent did not know when they would claim their pension, while those expecting to receive benefits at age 65 increased to 68.6 percent. Therefore, in examining the older cohorts, we find that the percent of those who are undecided declines and that more individuals are planning to claim their pension at age 65. On the other hand, for men who plan to receive the EPI (and thus are likely to be affected by the pension reform), the 1945-1946 cohorts (where age 63 is the eligible age to claim the flat-rate benefit) are most likely to expect to claim their pension at age 63. The 1947-1948 cohorts (where age 64 is the eligible age to claim the flat-rate benefit) are most likely to claim at age 64. Much younger cohorts (whose eligibility for the flat-rate benefit has increased to age 65) are a mixture of those who expect to claim their pension at age 65 and those who do not yet know what their expected claiming age will be, which is much the same as the younger cohorts in the NPI sample. Similar to the EPI male beneficiaries, the EPI female beneficiaries are more likely to delay claiming their pension based on the increase in the eligibility age for the flat-rate benefit. Thus, the reform appears to have an impact on the pension-claiming age of both male and female EPI beneficiaries.

We next examine whether individuals coordinate their decisions about when to begin claiming public pension benefits and when to retire (i.e., stop working). Table 3 looks at the relationship between the expected pension-claiming age and the expected retirement age for five

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<sup>7</sup> In Japan, the government's financial year runs from April to March of the following year.

municipalities in 2009, Naha in 2008, and Tosu in 2009.<sup>8</sup> Among men who are currently working, only 15.0 percent expect to claim their future pension benefits at about the same time that they retire. This low percentage is partly due to the fact that in Japan 38.9 percent expect to never stop working. Figure 2 displays the probability of the age at which workers expect to retire, conditional on fiscal year birth cohorts for the same sample as in Table 3. For those who plan to receive the NPI, individuals in younger cohorts expect to never stop working, but those who expect to retire after age 65 increases in the older cohorts. For those who plan to receive the EPI, individuals in younger cohorts are mixed with those who expect to never stop working and those who expect to retire age 60. In the older cohorts, the percent of individuals who expect to retire at a later age gradually increases, although a fraction of those who expect to never retire remains about the same. Hence, the retirement decision appears to be made independently of an individual's pension eligibility age, and also to be unaffected by pension reform. This pattern is clearly seen when we focus on male EPI beneficiaries who are working in jobs that have a mandatory retirement policy. Among this group, although 54.69 percent expect to claim their pension at age 65, only 24.6 percent expect to retire at age 65 and 33.8 percent expect to never stop working.<sup>9</sup>

In conclusion, the individual's expected age of claiming public pension benefits appears to be unrelated to their own and spousal retirement decisions and spousal pension-claiming age. This is in contrast to the U.S. and European countries where the pension-claiming age usually coincides with the claimant's or their spouse's retirement decisions. Proposals to reform the

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<sup>8</sup> When asked about the timing of retirement in the 2007 wave, 39.4 percent reported "undecided when to retire." In the 2009 survey, the respondents were given an additional option: "never expect to stop working," then there was a significant drop in those who reported "undecided." Specifically, among those who reported "undecided" in the 2007 wave, 54.85 percent reported "never expect to stop working" and 22.3 percent reported "undecided" in the 2009 wave. Therefore, we restrict the sample to those who responded to the revised JSTAR questionnaire for expected retirement age.

<sup>9</sup> As for the relationship between the expected pension-claiming ages reported by both husbands and wives of the JSTAR sample, about half of husbands and wives expect to claim their pension when they are age 65. Only 14.0 percent of husbands and wives expect to claim their pensions at the same time.

public pension – e.g., raise the full retirement age – have been found to encourage workers to delay their retirement in the U.S. (De Nardi, French, and Jones, 2010), but this policy reform may not have as large an effect on the retirement decisions in Japan as in the U.S., due to the fact that older Japanese workers already have quite a high work incentives.

#### **4.2. The Expected Public Pension Benefit Level**

Next, we next display the probability of the expected public pension benefit level. For this, we have information on the expected amount of public pension benefit and the expected ratio of the public pension benefit to pre-retirement earnings (replacement rate).

Figure 3 displays the probability of the expected amount of the public pension benefit, conditional on fiscal year birth cohorts, graphed separately by gender and by type of pension that is planned to be received. When we compare individuals who report “don’t know” with those who report knowing the expected amount, those who report “don’t know” are, on average: 2.25 years younger, 3.8 percent more likely to be female, and 4.3 percent more likely to be labor force participants. However, there is no noticeable difference in the educational level. In Figure 3, the median of the expected future public pension benefit for men (women) is 720,000 (630,000) yen for the NPI beneficiaries and 1,800,000 (840,000) yen for the EPI beneficiaries. The interquartile range of the distribution for men (women) is 400,000 (330,000) yen for the NPI beneficiaries and 1,400,000 (852,000) yen for the EPI beneficiaries. Therefore, the expected benefit level is greater and more widely distributed for EPI beneficiaries than for NPI beneficiaries. For both the NPI and EPI beneficiaries, the median of the distribution is about the same for younger and older cohorts, but the interquartile range of the distribution is larger for younger cohorts than for older cohorts. This suggests a greater uncertainty in the amount of the expected benefit level in the younger cohorts. Through the pension reform, there is no significant difference in the expected

benefit level for the EPI beneficiaries among the cohorts to which the uniform pensionable ages apply.

Since the wage-proportional part of the public pension benefits is proportional to the pre-retirement earnings, the heterogeneity in the expected public pension benefits for the EPI beneficiaries presumably reflects not only the heterogeneity in the individuals' expectations about the future structure of the pension system (which is subject to political reform), but also reflects heterogeneity in the individuals' labor earnings to which the benefits are tied. To extract the former heterogeneity, we utilize the questionnaire in JSTAR, which asks about the expected ratio of the public pension benefit to pre-retirement earnings (replacement rate, see E-033 in the Appendix). Figure 4 displays the probability of the expected ratio of the public pension benefit to pre-retirement earnings, conditional on fiscal year birth cohorts, separately by gender and by type of pension an individual is planning to receive. The majority of the younger male EPI beneficiaries do not know their expected replacement rate, but the "don't know" responses gradually decline in the older cohorts. The percent of individuals who report their expected replacement rate to be only 10-30 percent increases by more than 10 percent for the 1947-1948 cohorts of male EPI beneficiaries (whose pensionable age for the wage-proportional benefit is 60) when compared with the 1949-1952 cohorts (whose corresponding pensionable age is 61).

#### **4.3. The Expected Drop in Future Public Pension Benefits**

The JSTAR has a unique question that directly asks the respondents about the subjective uncertainty of their future public pension benefit levels. Specifically, JSTAR inquires about the likelihood that the benefit level expected to be received could be reduced by 10 percent or more in the future (see E034 in Appendix). Figure 5 displays the responses to the expected probability of a more-than-10 percent decrease in the public pension benefit level, conditional on fiscal year birth cohorts, and listed separately by gender and by type of pension to be received. Overall, 56.1 percent report that they do not know whether the public pension benefit will drop; and those who

report “don’t know” are 3.5 percent more likely to be female and slightly less likely to be educated, but differ little in other demographic characteristics. The fraction of the respondents who report 0 percent chance of reduction in future pension benefit level is higher in the older cohorts than in the younger cohorts, while that of the respondents who report more-than-a 50 percent chance of a 10 percent reduction is lower. Therefore, older cohorts tend to be less pessimistic than younger cohorts about the continuation of the structure of the public pension system. There appear to be no significant differences in the expected benefit level for the EPI beneficiaries among the consecutive cohorts to which the same pensionable ages apply through the pension reform.

In conclusion, there is substantial uncertainty and heterogeneity in beliefs about the future of the public pension program. Younger cohorts are less confident than older cohorts about future public pension benefits. They report greater probability of decline in future public pension benefits and more provide “don’t know” responses about their future public pension expectations. There are also differences between the NPI and the EPI beneficiaries in their expectations on public pensions. The EPI beneficiaries are affected by the pension reform and they have more of a picture of the future of the public pension program.

## **5. Public Pension Expectations and Pension Reform**

In this section, we use regression framework to (1) analyze the determinants of the public pension expectations and retirement expectations and (2) assess the effect of the pension reform on the public pension expectations and retirement expectations.

### **5.1. Expectations on Public Pension Benefits: Estimation Results**

In Section 5.1, we analyze the relationship between public pension expectations and socio-economic variables. Table 4 presents estimates of the effect of socio-economic characteristics on various measures of public pension expectations. These characteristics are: age,

gender, marital status, education, labor market experience, work status, health status, asset, income, chance to survive until age 75 divided by life table probability, city, and calendar years. When the dependent variable is continuous, the OLS estimates are shown. When the dependent variable is binary, the probit estimates of marginal effects evaluated at the mean value of the variable are shown. The sample includes five municipalities in 2007 and 2009, Naha in 2008, and Tosu in 2009, if not stated otherwise.

In Table 4, Column 1, we provide the estimated effects on the plan to receive public pensions. We find that age is not an important predictor of the likelihood of receiving a public pension in the future. To be eligible to receive the public pension in Japan, one must pay a monthly premium into the plan for a minimum of 25 years, so the labor market participants and those who have more than a high school education (and thus have better employment potential) are more likely to have a greater probability of receiving a public pension in the future. There is no significant difference between men and women in the probability of receiving a public pension. This may be because as dependent spouses, women have the right to receive an allowance added to their husbands' pensions. Those who expect a greater chance of surviving until age 75 are likely to be prepared to receive public pension benefits in the future.

In Table 4, Column 2, we present the estimated effect on the expected pension-claiming age. Individuals who are more educated (junior college or university and over) are more likely to expect to claim their public pension at an older age, while those who are in their late 50s (relative to those in early 50s), female, and those who are less healthy are more likely to expect to claim pension at a younger age. In Table 4, Column 3, we present the estimated effect on the expected retirement age. Individuals in their late 50s and early 60s (relative to those in early 50s) are more likely to expect to retire at a later age. Individuals in their late 50s plan to claim their public pension at a younger age, but they expect to stop working at a later age, indicating that for this group the public pension benefits are likely to be insufficient to maintain their living standards.

Those who have less employment potential (less income and less than high-school education) expect to retire at a later age. Also, those who expect a greater chance of surviving until age 75 expect to retire at a later age.

In Table 4, Columns 4 and 5, the estimated effects on the expected amount of the public pension benefit and the expected replacement ratio are presented, respectively. We find that individuals in their late 60s (relative to those in early 50s) expect to receive 69,740 yen more in public pension benefits, but the expected replacement ratio does not vary much by age.

In Table 4, Column 6, we present the estimated effect on the expected probability of more-than-10 percent drop in the future public pension benefits. As the question is only asked of the respondents and not their spouses, the sample size drops to 1148. The coefficient on those ages 60-65 is negative, suggesting that (1) individuals in their early 60s are much more confident of the continuation of the public pension system than those in their early 50s, and (2) individuals who are closer to claiming their public pension are able to perform more accurate pension calculations (Gustman and Steinmeier, 2005). Labor market participants are more likely to expect a drop in their future public pension benefits, as they may choose to work to guard against the decline in their future public pension.

## **5.2. The Effect of Pension Reforms on Expectations of Public Pension Benefits**

In this section, we evaluate the effect of pension reforms on individual expectations by utilizing a regression discontinuity design that exploits month of birth cutoff to determine the individuals' pensionable ages.

We examine whether there was a discrete change in public pension expectations on either side of the fixed threshold which is April 2 of those birth years affected by the reform (see Table 1, Panel A). That is, in a particular reform year, the pensionable age for the EPI beneficiaries whose birth date is before April 1 is shorter by one year than those whose birth date is later than April 2. In contrast, in the year when there is no reform, the pensionable age will remain the same

for all individuals, regardless of their birth date. Thus, we can conduct a regression discontinuity analysis to estimate the effect of pension reform on public pension expectations, by interacting a dummy for planning to receive Employee Pension Insurance ( $EPI_i$ ), a dummy for the reform year ( $REFORM_i$ ), and a dummy for birth date later than April 2 ( $BIRTH2_i$ ). Specifically, we estimate the following regression:

$$\begin{aligned}
y_i = & X_i\Pi + \alpha_1 + \alpha_2 EPI_i + \alpha_3 BIRTH2_i + \alpha_4 BIRTH2_i \times EPI_i \\
& + \alpha_5 REFORM_i + \alpha_6 REFORM_i \times EPI_i + \alpha_7 REFORM_i \times BIRTH2_i \\
& + \gamma_1 REFORM_i \times BIRTH2_i \times EPI_i + \varepsilon_i
\end{aligned} \tag{1}$$

where  $y_i$  is the measures of public pension expectations, and  $X_i$  is the covariates (socio-economic variables) as used in Table 4. The coefficient  $\gamma_1$  reflects the reform effect on the public pension expectations.<sup>10</sup> Note that in this analysis we assume that people do not change beneficiaries between the EPI and the NPI as a consequence of the reform.

Table 5 presents the estimation results. When we estimate Equation (1), we do not simply compare those born before April 2 with those born after April 2. Instead, we keep those born before April 2 as the reference category, but separate those born after April 2 to: (1) those born between April 2 to June 30 (2<sup>nd</sup> quarter), (2) those born between July 1 to September 31 (3<sup>rd</sup> quarter), and (3) those born between October 1 to December 31 (4<sup>th</sup> quarter). Thus,  $BIRTH2_i$  is composed of 2<sup>nd</sup> quarter, 3<sup>rd</sup> quarter, and 4<sup>th</sup> quarter dummies.

In Table 5, Column 1, we find that pension reform induces people to raise their expected pension-claiming age by 1.170 (.457) years for those born in the 2<sup>nd</sup> quarter (relative to those born in the 1<sup>st</sup> quarter who are unaffected by the reform), by 1.178 (.451) years for those born in the 3<sup>rd</sup> quarter, and by 1.068 (.445) years for those born in the 4<sup>th</sup> quarter. Therefore, the EPI

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<sup>10</sup> This framework is similar to Bottazzi et al. (2006) which studies how expected retirement age and expected replacement rate have been affected by the Italian pension reform.



beneficiaries are fully informed about the reform, and those affected by the reform respond by expecting to delay their pension claiming age by exactly one year. In Table 5, Column 2, the effect of pension reform on expected retirement age is reported. The pension reform raises the retirement age by .430 (1.759) years for those born in the 2<sup>nd</sup> quarter, -.996 (1.520) years for those born in the 3<sup>rd</sup> quarter, and .0145 (1.346) years for those born in the 4<sup>th</sup> quarter. The reform effect on retirement age is small and insignificant, and it appears that retirement decision is independent of pension reform.

According to the estimation results in Table 5 Column 3, people expect that due to the pension reform their future public pension benefit will drop by 280,000 yen per year for those born in the 2<sup>nd</sup> quarter, drop by 620,000 yen per year for those born in the 3<sup>rd</sup> quarter, but increase by 240,000 yen per year for those born in the 4<sup>th</sup> quarter. The reform effect on those born in the 3<sup>rd</sup> quarter is especially large in magnitude, amounting to a nearly 50 percent drop in their expected public pension benefit (as the median of the expected public pension benefit for the EPI beneficiaries is 1,200,000 yen). However, these estimates are noisy, and the sign for those born in the 4<sup>th</sup> quarter goes the opposite direction. Next, the reform effect on the expected replacement ratio is reported in Table 5, Column 4. We find a positive but small and insignificant reform effect, which is inconsistent with the negative effect on pension benefit level in Table 5, Column 3.

We conclude that the reform has noticeable effect on raising pension claiming age, but the results are inconclusive regarding the effect of pension reform on the expected public pension benefit levels.

## **6. The Effects of Expectations of Pension Benefits on Savings**

We examine how individuals' expectations about the future of the public pension benefit affect their savings decisions.

Our empirical specification is:

$$PS_i = \alpha + y_i\beta + X_i\Gamma + \varepsilon_i, \quad (2)$$

where  $PS_i$  is the private saving variable,  $y_i$  is the measures on public pension expectations,  $X_i$  is the covariates as used in Table 4, and  $\varepsilon_i$  is the error term. The key coefficient of interest is  $\beta$ , which reflects the effect of public pension expectations on private savings.

The above specification is based on the model which reflects the relationship between public pension-benefit wealth ( $PBW_i$ ) and private savings ( $PS_i$ ):

$$PS_i = \mu + \theta PBW_i + X_i\Lambda + \varepsilon_i. \quad (3)$$

where  $\theta < 0$  because of the substitution effect of public pension wealth ( $PBW_i$ ) on private savings ( $PS_i$ ).

We define the public pension wealth ( $PBW_i$ ) as follows: the present value of the expected future public pension benefits that will be received from the expected pension claiming age to the maximum length of life where the discount factor is composed of survival probability and interest rate. That is:

$$PBW_i = E_i(\sigma_i) \sum_{\tau=N_i}^T \delta_{i,\tau} \left( \frac{1}{1+r} \right)^{\tau-N_i}, \quad (4)$$

where  $\sigma_i$  is the planned amount of benefits,  $N_i$  is the expected pension claiming age,  $T$  is the maximum length of life,  $\delta_i$  is the survival probability, and  $r$  is the real interest rate. The variables  $\sigma_i$ ,  $N_i$ , and  $\delta_i$  can be obtained from the JSTAR, as  $\sigma_i$  can be substituted as the expected amount of public pension benefit (or the expected replacement ratio),  $N_i$  as the expected pension claiming age, and  $\delta_i$  as the expected chance to survive.

The individuals' expectations of benefits amounts  $E_i(\sigma_i)$  can be calculated as follows.

Let  $p_i$  denote the subjective probability that the public pension benefit could be reduced by more-than-10 percent in the future, which is also available in the JSTAR questionnaire (E034 in Appendix). We then can show that the expected amount of benefits  $E_i(\sigma_i)$  has a lower bound of  $0.9\sigma_i(1-p_i)$  and an upper bound of  $\sigma_i(1-0.1p_i)$ , because:

$$\begin{aligned} E_i(\sigma_i) &= [0, 0.9\sigma_i]p_i + [0.9\sigma_i, \sigma_i](1-p_i) \\ &= \sigma_i [0.9(1-p_i), (1-0.1p_i)]. \end{aligned} \quad (5)$$

In Equations (4) and (5), it is straightforward to argue that the planned public pension  $\sigma_i$  positively affects  $PBW_i$ , but the expected pension claiming age  $N_i$  negatively affects  $PBW_i$ . In addition, the upper and lower bounds of the expected amount of benefits  $E_i(\sigma_i)$  is negatively affected by  $p_i$ . Therefore, for simplicity, let us linearly approximate Equations (4) and (5) as:

$$PBW_i = \pi_0 + \pi_1\sigma_i + \pi_2N_i + \pi_3p_i + X_i\Psi + u_i. \quad (6)$$

where  $\delta_i$  is included in  $X_i$ . We predict that  $\pi_1 > 0$ ,  $\pi_2 < 0$ , and  $\pi_3 < 0$ . Next, plug Equation (6) into Equation (3) and obtain:

$$PS_i = \alpha + \phi_1\sigma_i + \phi_2N_i + \phi_3p_i + X_i\Gamma + \varepsilon_i. \quad (7)$$

Note that since  $\theta < 0$ , the expected signs of the coefficients are:  $\phi_1 < 0$ ,  $\phi_2 > 0$ , and  $\phi_3 > 0$ .

Equation (7) equals to Equation (2) when  $y_i = (\sigma_i, N_i, p_i)$ .

In Table 6, we estimate the reduced form private savings equation (Equation (7)). The dependent variable  $PS_i$  is a logarithm of the respondents' final saving goals which can be

obtained from the JSTAR.<sup>11</sup> The covariates  $X_i$  are the same as those in Table 4. The OLS estimates are reported in the first three columns of Table 6. In the specification in Column 1, which includes only  $p_i$  as the measure on public pension expectations, the effect of the probability of expecting a more-than-10 percent drop in future benefit is significantly positive. This implies that those who expect a decline in future public pension benefits plan to save more. The specification in Column 3 includes the variables  $\sigma_i$  (expected replacement ratio),  $N_i$ , and  $p_i$  as the measures of public pension expectations. A 10 percentage decline in the expected probability of more-than-10 percent decline in pension benefit raises the private savings goal by 7.9 percent, although the effect is insignificant. Those who report that they do not know whether their future benefits would decline save significantly more. Although effects are insignificant, those who plan to have a larger replacement ratio save less, as do those who expect to claim their pension later. Therefore, the signs on the coefficients  $p_i$  and  $\sigma_i$  are as we hypothesized in Equation (7), but the sign on the coefficient  $N_i$  is not in the expected direction.

The OLS estimates may be biased if the expectation about their public pension claiming age and the error term of private saving equation are correlated. In particular, individuals who opt to receive pensions after their pensionable ages may plan to retire later and thus save less.<sup>12</sup> To solve such an endogeneity problem, we use pension reform as a source of exogenous variation of the expected pension claiming age. Specifically, we use as instruments: the interaction between a

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<sup>11</sup> There are two reasons as to why we use the respondents' final savings goals to represent their private savings ( $PS$ ) in Equation (7). First, both the final savings goal and the private pension wealth ( $PBW$ ) are the expected values. Second, while the  $PBW$  is the present value at the pension claiming age, the final savings goal is usually considered to be the amount the respondents are planning to save by their pension claiming age; thus, in Equation (3), we assume that the  $PS$  and the  $PBW$  are measured at about the same time.

<sup>12</sup> Since the benefit formula for the wage-proportional part is based on the average total earnings and the length of insured (working) period, the respondents who expect a larger amount of future benefits may have a larger savings because they obtained greater earnings. Therefore, we control earnings as covariates in Equation (7).

dummy for planning to receive the Employer Pension Insurance ( $EPI_i$ ), a dummy for the reform year ( $REFORM_i$ ), and a dummy for birth date later than April 1 ( $BIRTH2_i$ ), which are used as independent variables in Equation (1).<sup>13</sup> Note that pension reform has a positive impact in delaying the expected pension claiming age, and thus can be used as instruments for the expected pension claiming age. In the last two columns in Table 6, we report the IV estimates. In Column 5, the sign of coefficient of pension claiming age is now the same as that predicted in Equation (7), although all the effects are insignificant except among those individuals who report “don’t know,” where they have a positive and significant effect on savings. We obtain similar results when we use the amount of expected public pension benefit to represent  $\sigma_i$ .

Therefore, we conclude that those who “don’t know” whether their future benefits would decline would significantly increase their final savings goal. We only find weak evidence that (1) a reported drop in expectations about the future public pension benefit has a positive effect on the individual’s private savings goal, (2) a decrease in pension benefit levels has positive effect on private savings goal, and (3) an increase in pension claiming age has positive effect on private savings goal.

## 7. Conclusion

Using the Japanese Study of Aging and Retirement (JSTAR), we find that many Japanese in their early 50s do not believe that public pension benefits will be there for them when they retire. We also find that the anxiety about the public pension program’s future might induce people to save more. Restoring balance to the public pension could reduce the long-term deficit and make

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<sup>13</sup> We assume that the actual pension benefit changes exogenously, and that the EPI beneficiaries did not switch jobs nor become NPI beneficiaries to offset the impact of the pension reform on their savings. Bottazzi et al. (2008) estimate the substitution effect of pension wealth on private wealth by using dummies for post Italian pension reform period and employment groups as instruments.

people feel more secure about their retirement. Therefore, it is possible that eliminating the public pension shortfall could reduce the misplaced fear that causes Japanese to over-save.

## Appendix: Questionnaire regarding Pension Expectations

### First wave, 2007, 5 Cities

(1) E-028. In the future do you expect to receive any further public pension?

1. Yes
2. No
3. Don't know
4. Refused to answer

If answer to E-028 was 1, go to E-030; otherwise, go to E-029-1 (Benchmark: spouse present).

(2) E-030. What type of pension is it? Please select the most appropriate choice from the following.

1. National Pension Plan (basic old-age pension)
2. Old age welfare annuity or retirement mutual pension (including basic pension)
3. Survivor's pension
4. Disability pension
5. Don't know
6. Refused to answer

Regardless of answer, go to E-031.

(3) E-031. At what age do you expect to begin receiving that pension?

1. Age:
2. Don't know
3. Refused to answer

Regardless of answer, go to E-032.

(4) E-032. About how much do you expect to receive per year before taxes? If you don't mind, please tell me the total amount that will be deposited to your bank or postal account.

1. Approximately \_\_\_\_ yen
2. Don't know
3. Refused to answer

Regardless of answer, go to E-033.

(5) E-033. About what percent of your last working salary does that amount to? If you did not work before, please say so.

1. \_\_\_\_%
2. Did not work
3. Don't know
4. Refused to answer

Regardless of answer, go to E-034.

(6) E-034. Do you think it is likely that the amount you expect to receive could be reduced by 10% or more in the future? If you don't think this is possible, please say so.

1. \_\_\_\_ %
2. No possibility
3. Don't know
4. Refused to answer

Regardless of answer, go to E-035-1.

The respondents are questioned: (1), (2), (3), and (4) regarding their spouses' pension expectations.

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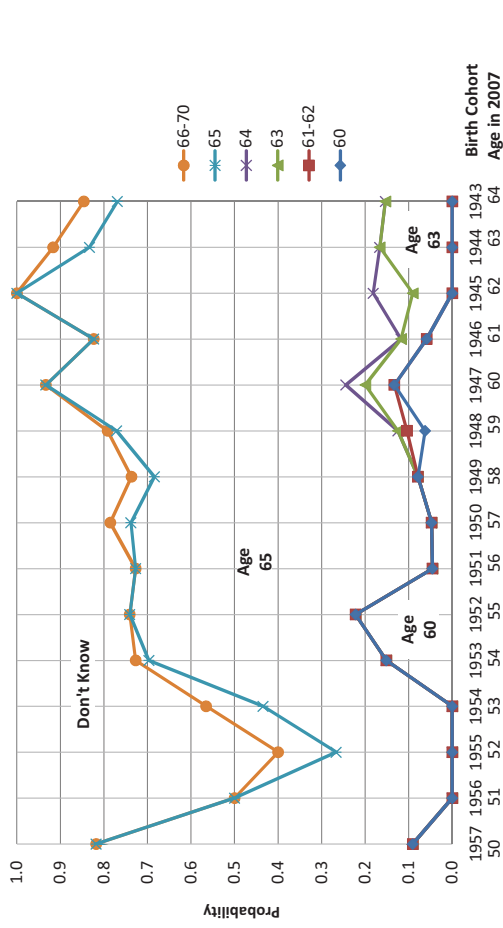
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Figure 1: Probability of Expected Pension Claiming Age, Conditional on Birth Cohort

Panel A  
Sample: Men who Plan to Receive National Pension Insurance (NPI), 5 Cities 2007, Naha 2008, and Tosu 2009.



Panel B  
Sample: Men who Plan to Receive Employee Pension Insurance (EPI), 5 Cities 2007, Naha 2008, and Tosu 2009

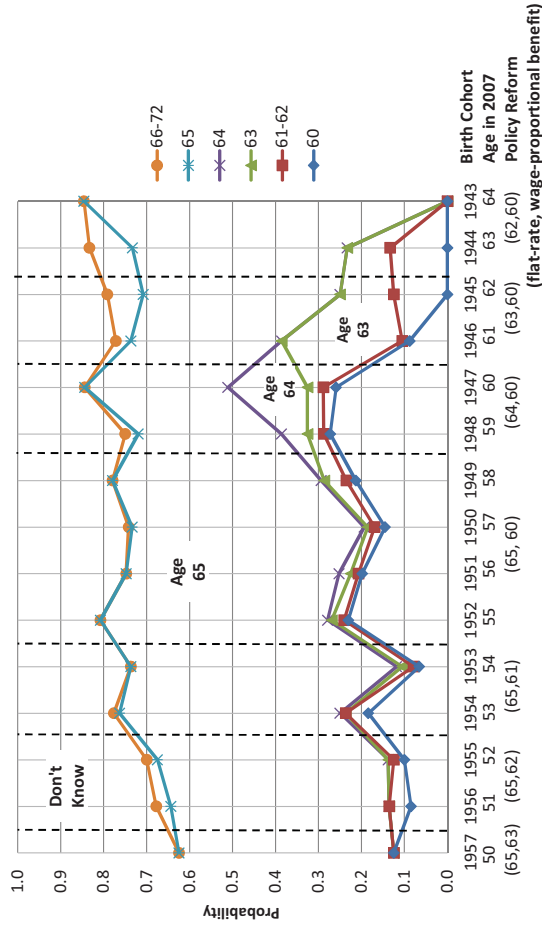
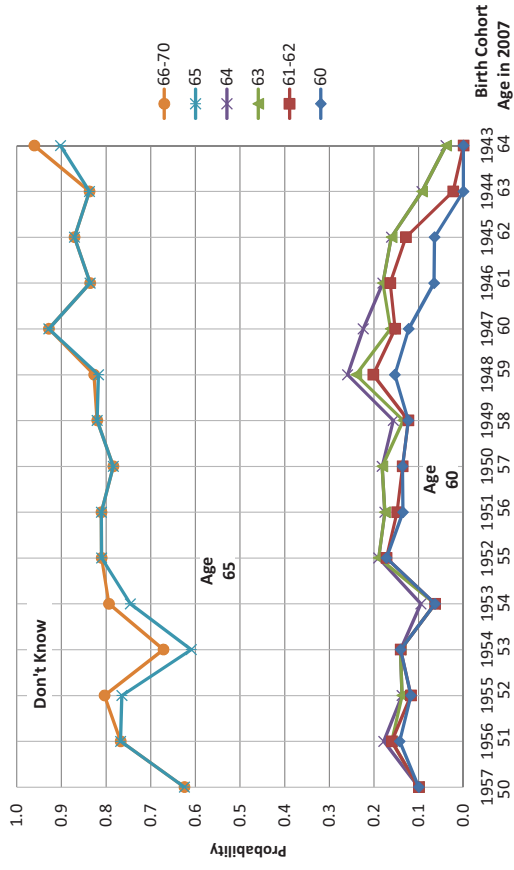


Figure 1: Probability of Expected Pension Claiming Age, Conditional on Birth Cohort

Panel C  
Sample: Women who Plan to Receive National Pension Insurance (NPI), 5 Cities 2007, Naha 2008, and Tosu 2009



Panel D  
Sample: Women who Plan to Receive Employee Pension Insurance (EPI), 5 Cities 2007, Naha 2008, and Tosu 2009

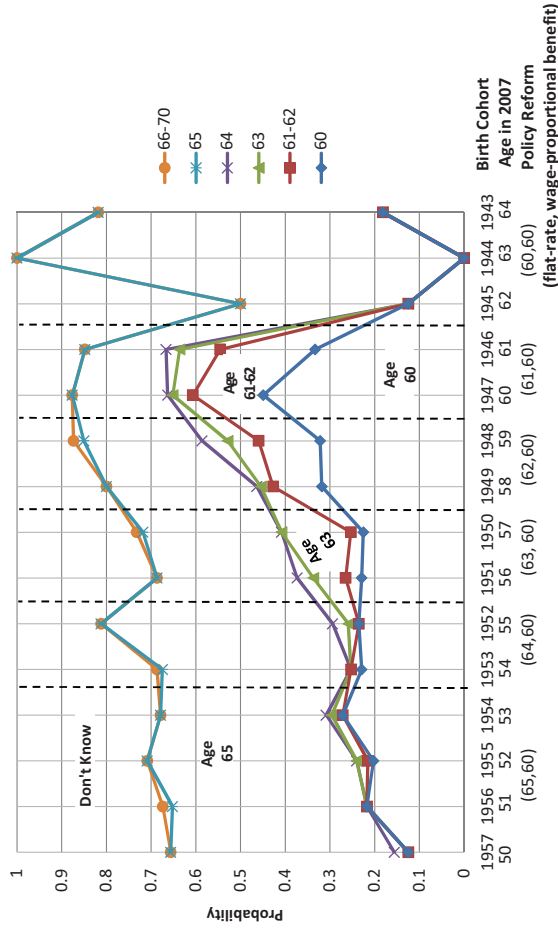
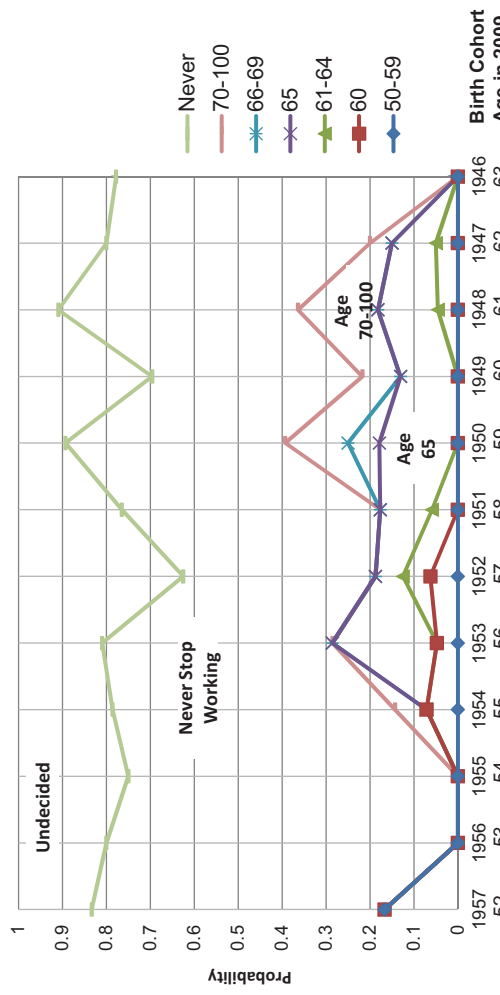


Figure 2: Probability of Expected Retirement Age, Conditional on Birth Cohort

Panel A

Sample: Men, Plan to Receive National Pension Insurance: 5 Cities 2009, Naha 2008, and Tosu 2009



Panel B

Sample: Men, Plan to Receive Employee Pension Insurance: 5 Cities 2009, Naha 2008, and Tosu 2009

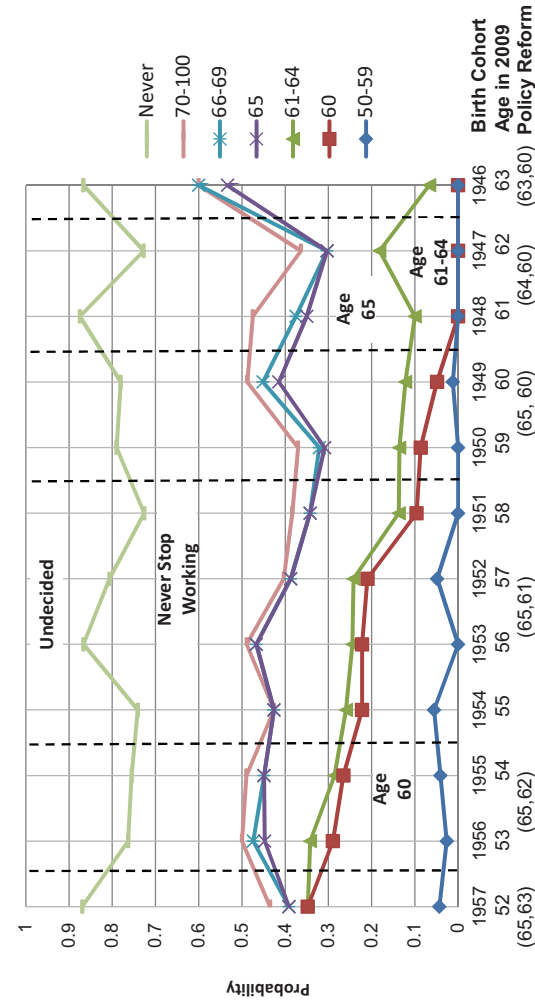
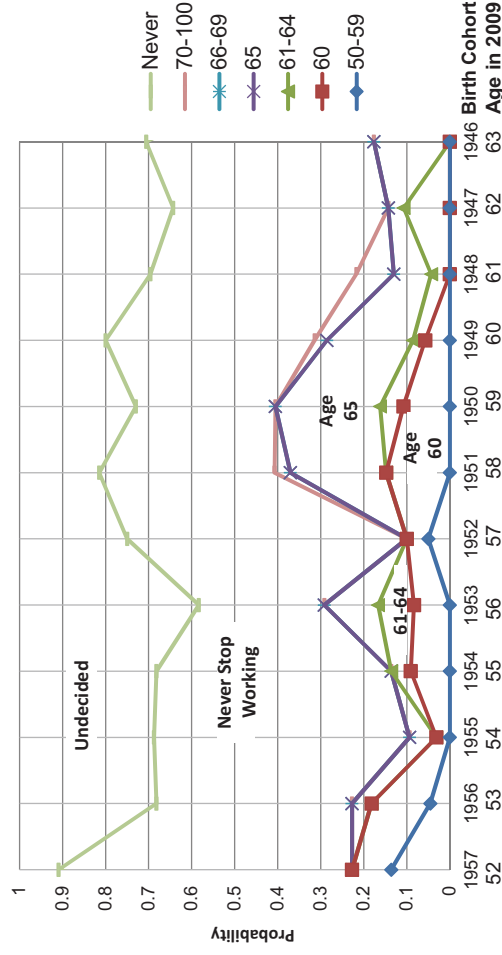


Figure 2: Probability of Expected Retirement Age, Conditional on Birth Cohort

Panel C

Sample: Women, Plan to Receive National Pension Insurance: 5 Cities 2009, Naha 2008, and Tosu 2009



Panel D

Sample: Women, Plan to Receive Employee Pension Insurance: 5 Cities 2009, Naha 2008, and Tosu 2009

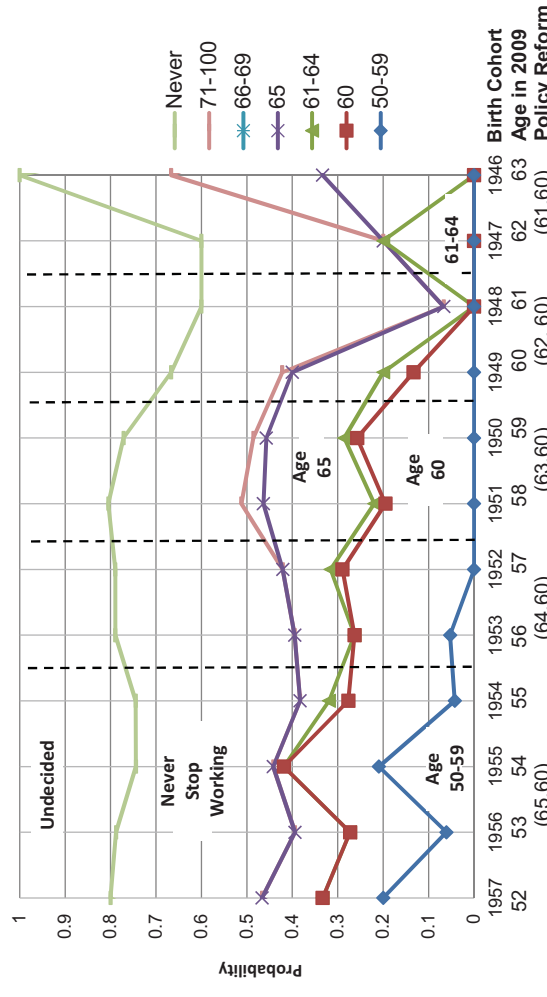
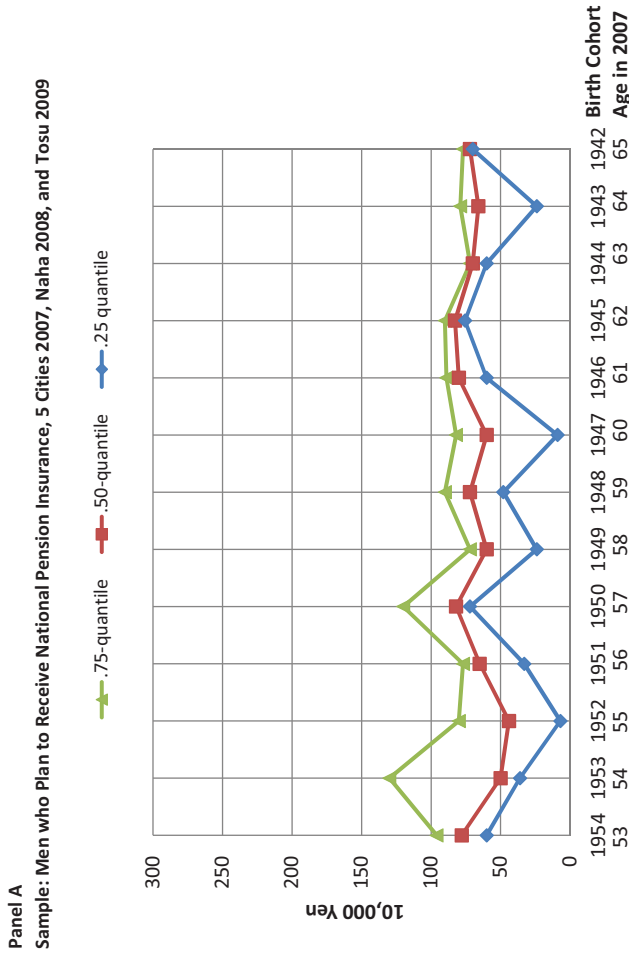


Figure 3: Quantiles of Expected Amount of Public Pension Benefit, Conditional on Birth Cohort



**Panel B**  
 Sample: Men who Plan to Receive Employee Pension Insurance, 5 Cities 2007, Naha 2008, and Tosu 2009

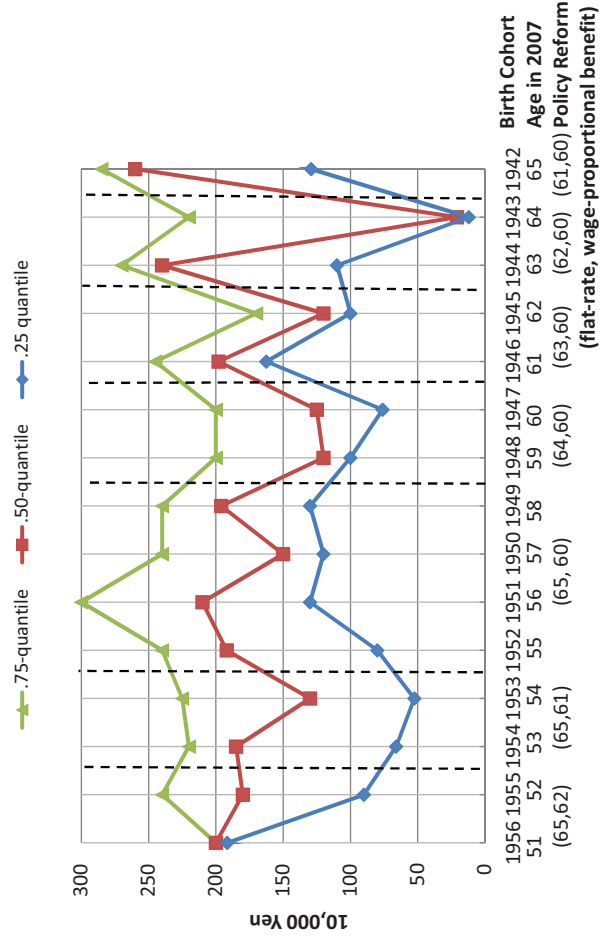
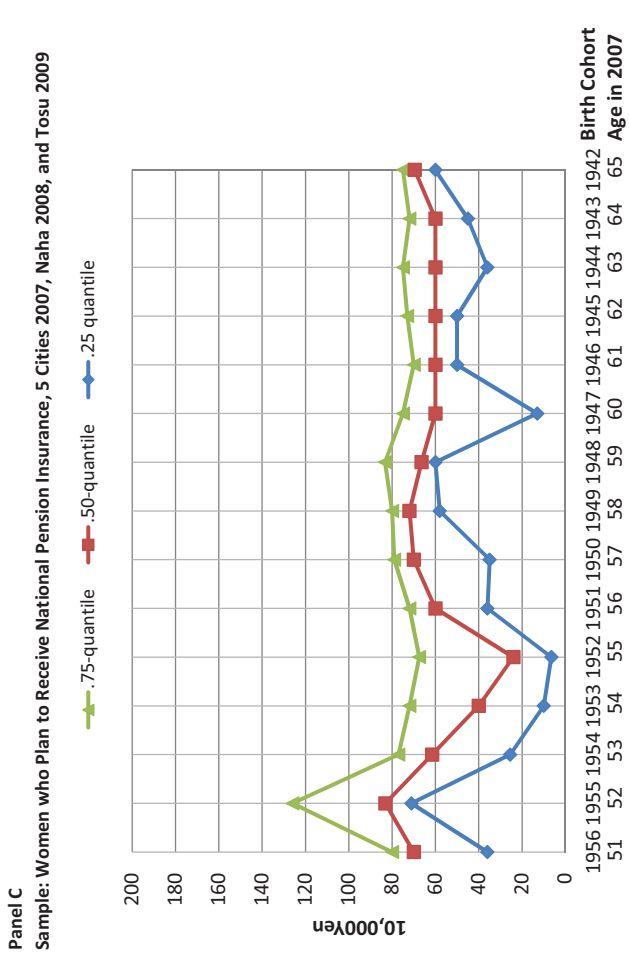


Figure 3: Quantiles of Expected Amount of Public Pension Benefit, Conditional on Birth Cohort



**Panel D**  
 Sample: Women who Plan to Receive Employee Pension Insurance, 5 Cities 2007, Naha 2008, and Tosu 2009

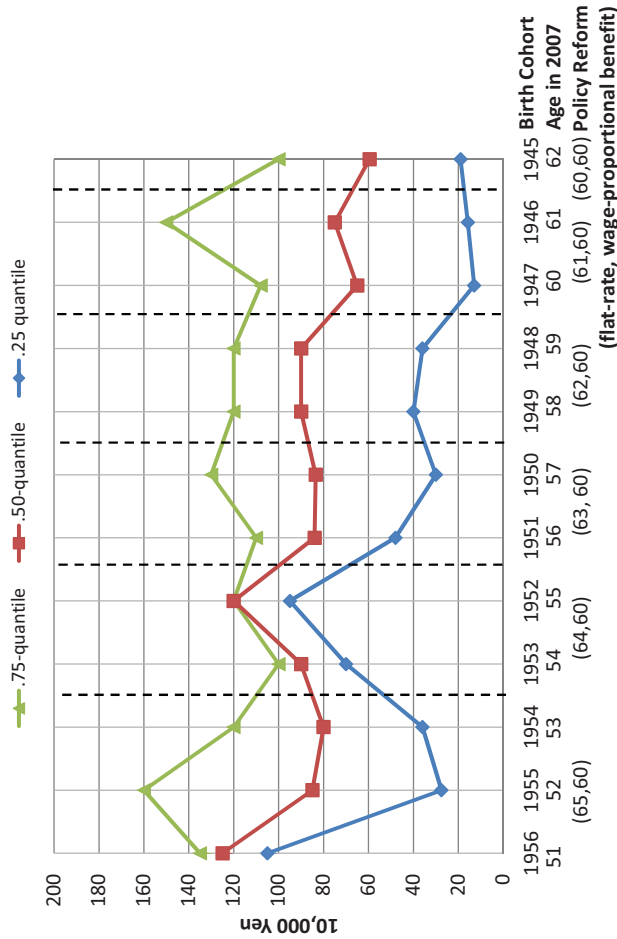
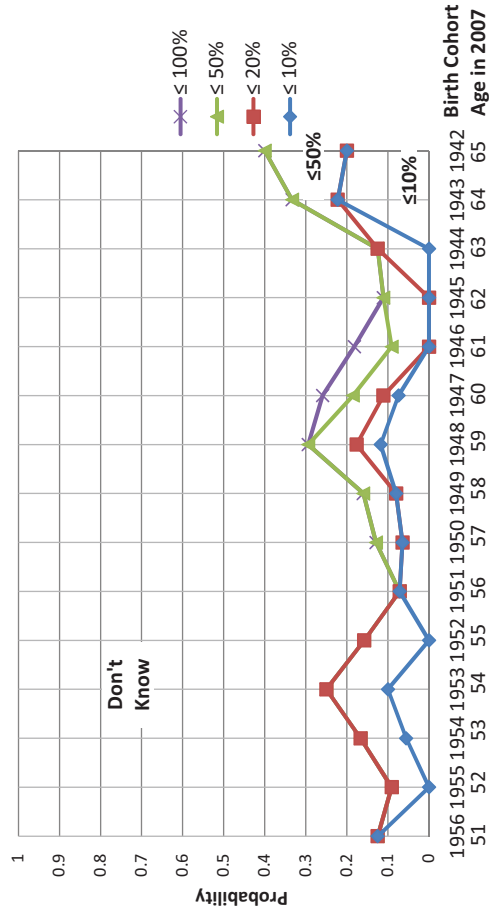


Figure 4: Probability of Expected Ratio of Public Pension Benefits to Pre-Retirement Earnings, Conditional on Birth Cohort

Panel A

Sample: Men who Plan to Receive National Pension Insurance, 5 Cities 2007, Naha 2008, and Tosu 2009



Panel B

Sample: Men who Plan to Receive Employee Pension Insurance, 5 Cities 2007, Naha 2008, and Tosu 2009

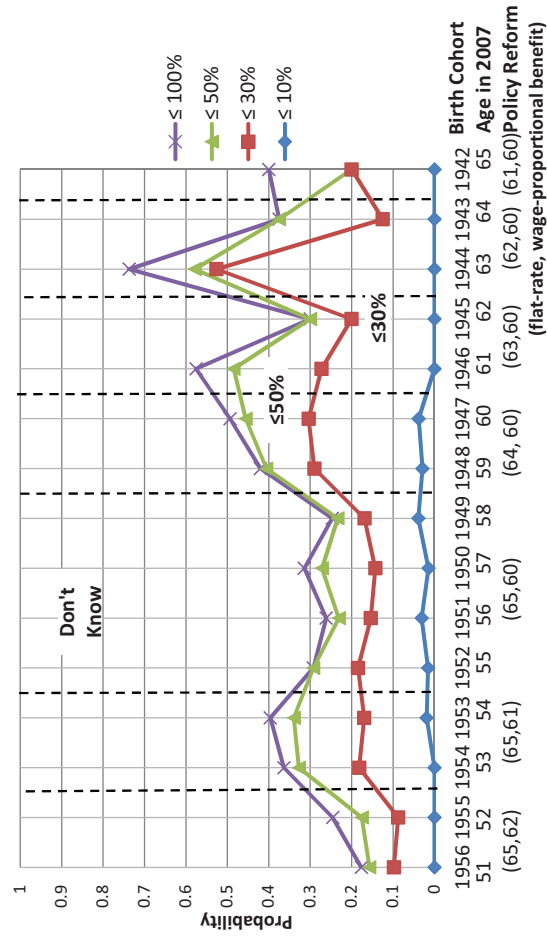
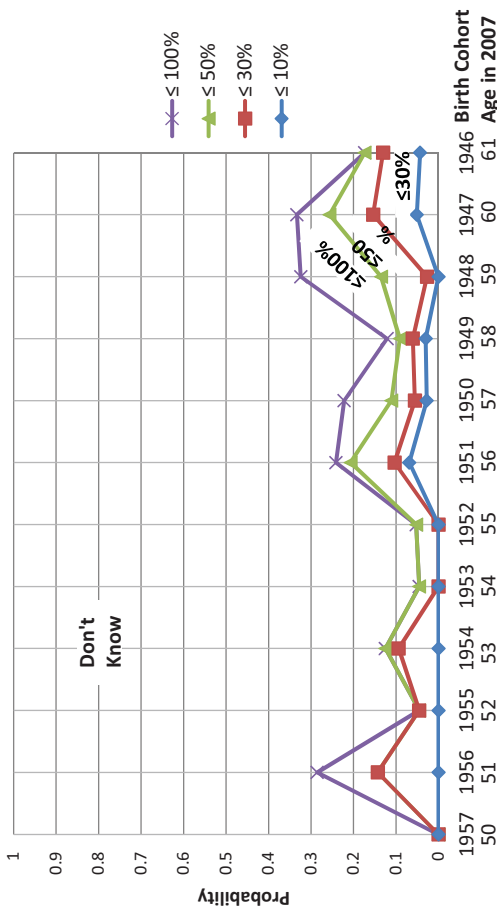


Figure 4: Probability of Expected Ratio of Public Pension Benefits to Pre-Retirement Earnings, Conditional on Birth Cohort

Panel C

Sample: Women who Plan to Receive National Pension Insurance, 5 Cities 2007, Naha 2008, and Tosu 2009



Panel D

Sample: Women who Plan to Receive Employee Pension Insurance, 5 Cities 2007, Naha 2008, and Tosu 2009

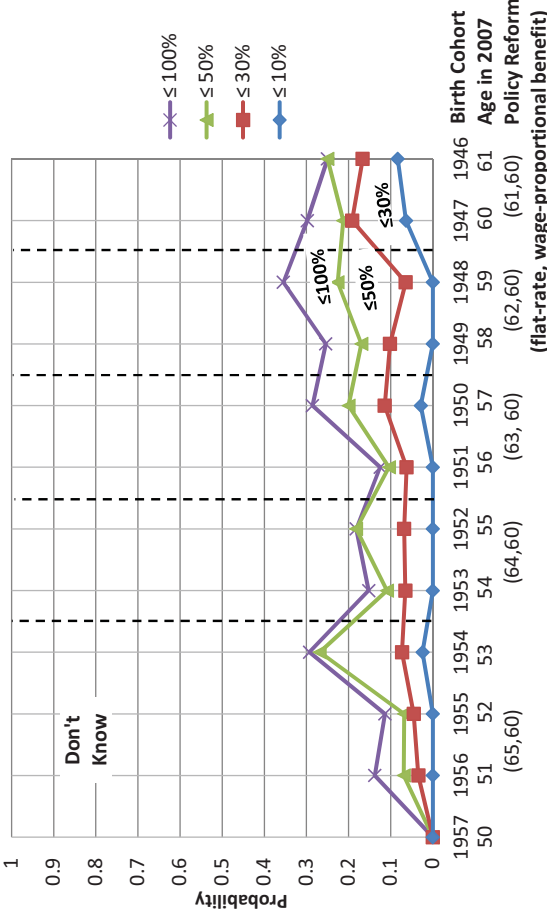
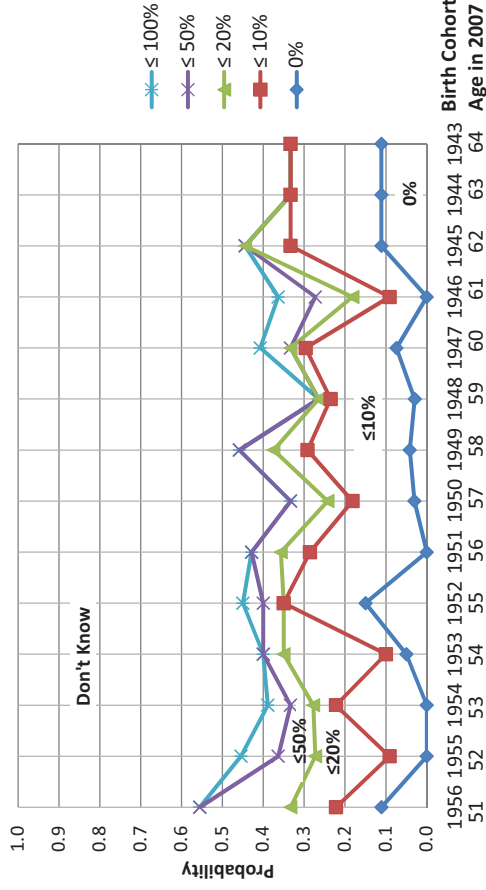


Figure 5: Probability of Expected Prob. of More-than-10% Decline in Public Pension Benefits, Conditional on Birth Cohort

Panel A

Sample: Men who Plan to Receive National Pension Insurance, 5 Cities 2007, Naha 2008, Tosu 2009



Panel B

Sample: Men who Plan to Receive Employee Pension Insurance, 5 Cities 2007, Naha 2008, Tosu 2009

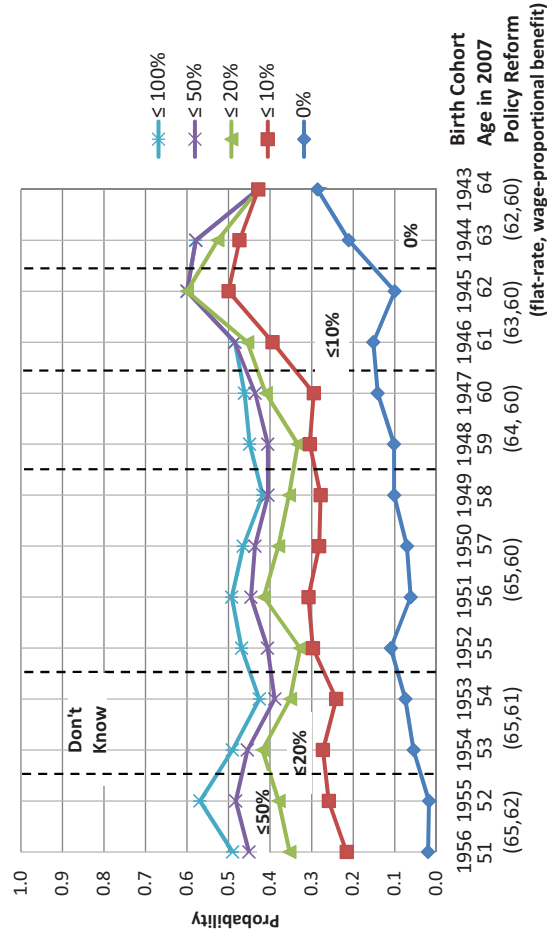
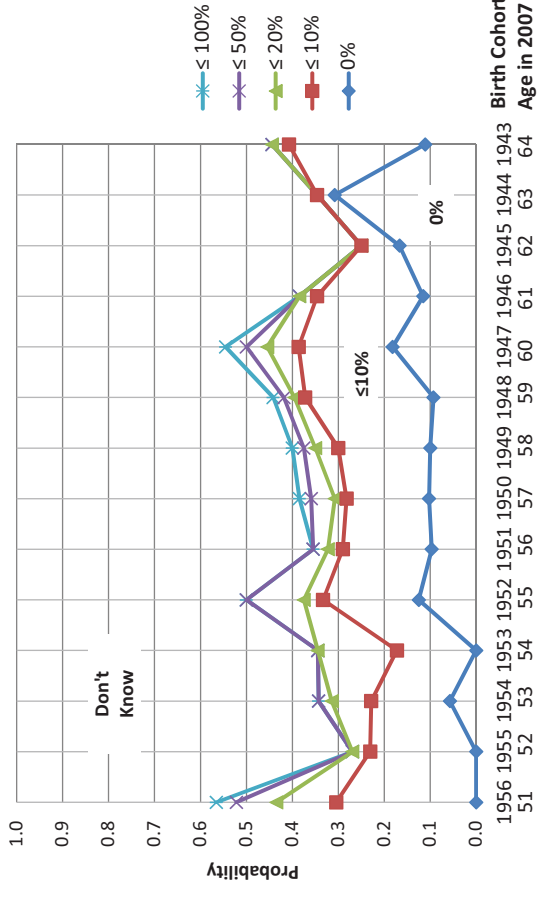


Figure 5: Probability of Expected Prob. of More-than-10% Decline in Public Pension Benefits, Conditional on Birth Cohort

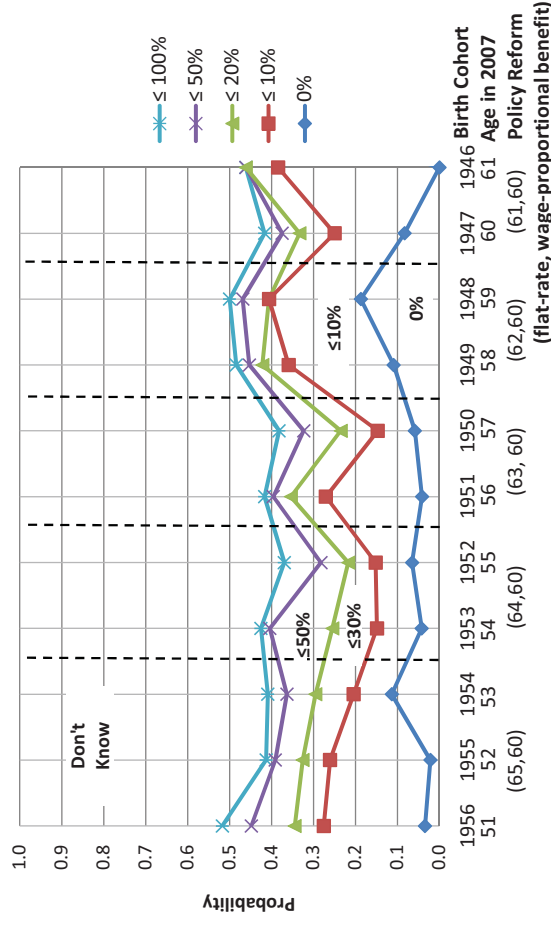
Panel C

Sample: Women who Plan to Receive National Pension Insurance, 5 Cities 2007, Naha 2008, Tosu 2009



Panel D

Sample: Women who Plan to Receive Employee Pension Insurance, 5 Cities 2007, Naha 2008, Tosu 2009



**Table 1: Reforms on Public Pension and Employment Policy for the Elderly**

**Panel A: Public Pension Reform: Schedule for Raising Pensionable Age**

Birth Cohort	Reform Year	National Pension Insurance	Employee Pension Insurance	
		Flat-rate benefit	Flat-rate benefit	Wage proportional benefit
<b>Men</b>				
1941.4.2-1943.4.1	2001	65	<b>61</b>	60
1943.4.2-1945.4.1	2004	65	<b>62</b>	60
1945.4.2-1947.4.1	2007	65	<b>63</b>	60
1947.4.2-1949.4.1	2010	65	<b>64</b>	60
1949.4.2-1953.4.1	2013	65	<b>65</b>	60
1953.4.2-1955.4.1	2013	65	65	<b>61</b>
1955.4.2-1957.4.1	2016	65	65	<b>62</b>
1957.4.2-1959.4.1	2019	65	65	<b>63</b>
1959.4.2-1961.4.1	2022	65	65	<b>64</b>
1961.4.2-	2025	65	65	<b>65</b>

<b>Women</b>				
1946.4.2-1948.4.1	2006	65	<b>61</b>	60
1948.4.2-1950.4.1	2009	65	<b>62</b>	60
1950.4.2-1952.4.1	2012	65	<b>63</b>	60
1952.4.2-1954.4.1	2015	65	<b>64</b>	60
1954.4.2-1958.4.1	2015	65	<b>65</b>	60
1958.4.2-1960.4.1	2018	65	65	<b>61</b>
1960.4.2-1962.4.1	2021	65	65	<b>62</b>
1962.4.2-1964.4.1	2024	65	65	<b>63</b>
1964.4.2-1966.4.1	2027	65	65	<b>64</b>
1966.4.2-	2030	65	65	<b>65</b>

**Panel B: Employment Policy Reform**

Birth Cohort	Reform Year	Retirement Age
1941.4.2-1943.4.1		60
1943.4.2-1945.4.1		60
1945.4.2-1946.4.1	2006	62
1946.4.2-1947.4.1	2007	63
1947.4.2-1949.4.1	2010	64
1949.4.2-1953.4.1	2013	65
1953.4.2-1955.4.1		65
1955.4.2-1957.4.1		65
1957.4.2-1959.4.1		65
1959.4.2-1961.4.1		65
1961.4.2-		65

**Table 2: Summary Statistics of Key Variables****Sample: Five Municipalities 2007, Naha 2008, and Tosu 2009**

	Mean	SD	Min	Max	25th perc.	Median	75th perc.
Age	56.69	3.644	50	65	54	57	59
Female	0.486	0.500	0	1	0	0	1
Married	0.852	0.355	0	1	1	1	1
Less than high school	0.155	0.362	0	1	0	0	0
High school	0.457	0.498	0	1	0	0	1
Junior college	0.180	0.385	0	1	0	0	0
University or more	0.206	0.404	0	1	0	0	0
ADL Disability	0.098	0.297	0	1	0	0	0
Income	571.2	539.3	0	11650	280	500	760
Asset	641.2	1360.1	0	16100	0	150	700
Currently working for pay	0.843	0.364	0	1	1	1	1
Labor market experience	26.50	13.26	0	50	17	31	37
Chance to survive until age 75 divided by life table probability	1.020	0.342	0	1.400	0.834	1.131	1.292
Plan to Receive National Pension Insurance (NPI)	0.368	0.482	0	1	0	0	1
Plan to Receive Employer Pension Insurance (EPI)	0.617	0.486	0	1	0	1	1
Expected public pension claiming age	63.78	2.205	60	72	62	65	65
Expected amount of public pension benefit	105.2	86.17	0	500	48	80	150
Expected replacement ratio	4.335	4.747	0	50	3	3	5
Expected probability of more-than-10% drop in public pension benefit	17.97	22.57	0	100	10	10	20



Table 3: Relationship between Expected Pension Claiming Age and Expected Retirement Age

Panel A

Sample: Men, Plan to Receive National Insurance Pension: 5 Cities 2009, Naha 2008, and Tosu 2009

Expected Retirement Year	Expected Age of Inception of Public Pension Benefits							Total
	60	61-64	65	66-69	70	71-75	Don't Know	
50-59	0	0	0.0049	0	0	0	0	0.0049
60	<b>0</b>	0	0.0099	0	0	0	0.0049	0.0148
61-64	0	<b>0</b>	0.0197	0	0	0	0	0.0197
65	0.0099	0.0049	<b>0.0887</b>	0	0.0049	0	0.0049	0.1133
66-69	0	0	0.0099	<b>0</b>	0	0	0.0049	0.0148
70	0.0049	0	0.0197	0	<b>0</b>	0	0.0099	0.0345
71-75	0	0.0049	0.0099	0	0	<b>0</b>	0.0099	0.0246
76-100	0	0	0	0	0	0	0	0
Never	0.0345	0.0099	<b>0.3744</b>	0.0049	0.0148	0	0.1330	<b>0.5714</b>
Undecided	0.0099	0	0.1133	0	0	0	0.0690	0.1921
Don't Know	0	0	0	0	0.0049	0	0.0049	0.0099
<b>Total</b>	0.0591	0.0197	<b>0.6502</b>	0.0049	0.0197	0	0.2414	203

Panel B

Sample: Men, Plan to Receive Employee Pension Insurance: 5 Cities 2009, Naha 2008, and Tosu 2009

Expected Retirement Year	Expected Age of Inception of Public Pension Benefits							Total
	60	61-64	65	66-69	70	71-75	Don't Know	
50-59	0.0016	0.0032	0.0128	0	0	0	0.0032	0.0207
60	<b>0.0207</b>	0.0096	0.0574	0.0016	0	0	0.0303	0.1196
61-64	0.0064	<b>0.0112</b>	0.0271	0	0	0	0.0064	0.0510
65	0.0223	0.0175	<b>0.1132</b>	0.0016	0	0	0.0383	0.1930
66-69	0.0032	0.0016	0.0128	<b>0.0016</b>	0	0	0	0.0191
70	0.0048	0.0048	0.0191	0	<b>0</b>	0	0.0016	0.0303
71-75	0.0016	0	0.0032	0	0	<b>0.0016</b>	0.0016	0.0080
76-100	0	0	0	0	0	0	0.0016	0.0016
Never	0.0638	0.0255	<b>0.1691</b>	0.0016	0.0032	0	0.0797	<b>0.3429</b>
Undecided	0.0287	0.0080	0.0941	0	0.0016	0	0.0478	0.1802
Don't Know	0.0064	0.0016	0.0080	0	0.0016	0	0.0159	0.0335
<b>Total</b>	0.1531	0.0813	<b>0.5088</b>	0.0064	0.0048	0.0016	0.2105	627

Table 3: Relationship between Expected Pension Claiming Age and Expected Retirement Age

Panel C

Sample: Women, Plan to Receive National Insurance Pension: 5 Cities 2009, Naha 2008, and Tosu 2009

Retirement Year	Age Plan to Receive Public Pension							Total
	60	61-64	65	66-69	70	71-75	Don't Know	
50-59	0.0030	0	0.0030	0	0	0	0.0120	0.0181
60	<b>0.0120</b>	0	0.0392	0	0	0	0.0151	0.0663
61-64	0.0030	<b>0.0060</b>	0.0211	0	0	0	0	0.0301
65	0.0151	0.0030	<b>0.0813</b>	0.0030	0.0030	0	0.0090	0.1145
66-69	0.0030	0	0	<b>0</b>	0	0	0.0030	0.0060
70	0	0	0	0	<b>0</b>	0	0.0030	0.0030
71-75	0	0	0	0	0	<b>0</b>	0.0030	0.0030
76-100	0	0	0	0	0	0	0	0
Never	0.0693	0.0030	<b>0.2952</b>	0	0.0120	0	0.0904	<b>0.4699</b>
Undecided	0.0151	0	0.1355	0	0	0	0.0572	0.2078
Don't Know	0.0120	0	0.0422	0	0	0	0.0271	0.0813
Total	0.1205	0.0120	<b>0.5753</b>	0.0030	0.0151	0	0.1928	332 0.10219

Panel D

Sample: Women, Plan to Receive Employee Pension Insurance: 5 Cities 2009, Naha 2008, and Tosu 2009

Retirement Year	Age Plan to Receive Public Pension							Total
	60	61-64	65	66-69	70	71-75	Don't Know	
50-59	0.0233	0.0026	0.0233	0	0	0	0.0052	0.0543
60	<b>0.0336</b>	<b>0.0129</b>	<b>0.1111</b>	0	0	0	0.0362	0.1938
61-64	0.0103	<b>0.0026</b>	0.0103	0	0	0	0	0.0233
65	0.0310	0.0155	<b>0.0491</b>	0	0	0	0.0258	0.1214
66-69	0	0	0.0052	<b>0</b>	0	0	0	0.0052
70	0.0026	0	0.0026	0	<b>0</b>	0	0.0026	0.0078
71-75	0	0	0	0	0	<b>0</b>	0.0026	0.0026
76-100	0	0	0	0	0	0	0	0
Never	0.0956	0.0362	<b>0.1085</b>	0.0026	0.0026	0	0.0853	<b>0.3307</b>
Undecided	0.0310	0.0078	0.0904	0	0.0026	0	0.0465	0.1783
Don't Know	0.0181	0.0026	0.0310	0	0	0	0.0310	0.0827
Total	0.2274	0.0775	<b>0.4005</b>	0.0026	0.0052	0	0.2041	387

**Table 4: Estimates of Public Pension Expectations**

Independent Variables	Dependent Variable					
	Plan to Receive Public Pension Benefit	Expected Pension Claiming Age	Expected Retirement Age	Amount of Expected Public Pension Benefit	Expected Replacement Rate	% Decline in Expected Public Pension Benefit
	(1)	(2)	(3)	(4)	(5)	(6)
<b>Age 55-59</b>	0.015 (0.010)	-0.434 ** (0.105)	1.860 ** (0.304)	3.805 (7.698)	-0.256 (0.452)	-1.681 (1.898)
<b>Age 60-65</b>	0.001 (0.012)	-0.006 (0.118)	3.959 ** (0.336)	6.974 (8.613)	-0.371 (0.414)	-10.524 ** (2.240)
<b>Female</b>	0.016 (0.011)	-0.588 ** (0.107)	-1.900 ** (0.291)	-58.270 ** (6.928)	0.576 (0.453)	0.918 (2.113)
<b>Working for pay</b>	0.025 * (0.013)	0.290 ** (0.116)		-1.733 (5.347)	0.348 (0.387)	4.962 ** (2.312)
<b>Number of years worked</b>	0.001 (0.0004)	-0.006 (0.004)	0.005 (0.013)	0.086 (0.207)	-0.017 (0.025)	-0.007 (0.079)
<b>Asset</b>	0.001 ** (0.0005)	-0.003 (0.002)	-0.013 (0.010)	-0.124 (0.108)	-0.005 (0.004)	0.009 (0.038)
<b>Income</b>	0.002 (0.002)	0.004 (0.010)	-0.053 * (0.031)	1.830 ** (0.685)	-0.084 ** (0.033)	-0.371 ** (0.186)
<b>Chance to survive until age 75 divided by life table</b>	0.031 ** (0.016)	0.150 (0.162)	0.944 ** (0.404)	4.373 (8.914)	-0.235 (0.439)	-4.170 (2.687)
<b>Married</b>	0.058 ** (0.018)	-0.173 (0.151)	-0.077 (0.440)	11.535 (8.534)	0.630 ** (0.300)	5.472 ** (2.211)
<b>Less than high school</b>	-0.032 ** (0.015)	0.012 (0.117)	0.853 ** (0.404)	-15.720 ** (6.100)	0.528 (0.609)	-0.339 (1.988)
<b>Junior college</b>	0.010 (0.012)	0.295 ** (0.115)	0.446 (0.351)	14.111 * (8.064)	-0.089 (0.316)	-1.423 (2.327)
<b>University and over</b>	-0.001 (0.013)	0.492 ** (0.123)	0.394 (0.340)	10.780 (9.739)	0.256 (0.420)	0.751 (2.454)
<b>EPI beneficiaries</b>		-1.247 ** (0.089)	-1.714 ** (0.299)	48.252 ** (5.573)	0.598 * (0.315)	1.870 (1.673)
<b>Sendai</b>	-0.036 ** (0.016)	0.390 ** (0.135)	-0.012 (0.402)	18.880 ** (9.207)	0.561 (0.519)	10.219 ** (2.672)
<b>Takikawa</b>	0.057 ** (0.013)	0.669 ** (0.145)	0.180 (0.387)	6.743 (8.180)	1.038 ** (0.403)	2.360 (3.446)
<b>Shirakawa</b>	0.048 ** (0.013)	0.763 ** (0.143)	-0.083 (0.390)	4.416 (10.982)	0.871 (0.652)	-7.772 ** (2.100)
<b>Adachi</b>	0.003 (0.016)	0.268 * (0.147)	1.092 ** (0.397)	-3.227 (7.894)	0.524 (0.520)	-2.489 (2.455)
<b>Naha</b>	-0.126 ** (0.025)	0.084 (0.168)	-0.823 (0.549)	4.023 (9.852)	0.959 (0.799)	8.294 ** (2.944)
<b>Tosu</b>	-0.122 (0.039)	0.592 ** (0.248)	-0.876 (0.538)	1.333 (11.952)	0.328 (0.544)	-12.202 ** (4.287)
<b>Self-rated health: Good</b>	-0.020 ** (0.010)	-0.192 ** (0.089)	-0.368 (0.252)	3.615 (6.226)	-0.289 (0.347)	1.813 (1.635)
<b>Self-rated health: Fair/Poor</b>	0.002 (0.015)	-0.424 ** (0.154)	0.728 (0.535)	-6.035 (7.661)	-0.609 (0.372)	1.073 (2.379)
<b>N</b>	5131	2806	1270	977	701	1148

Note: All regressions include indicators for missing variables. Columns 2-6 report the OLS estimates and Column 1 reports the marginal effects of a probit. Robust standard errors are in parentheses. \*Significant at 10%; \*\*significant at 5%.

**Table 5: Effect of Public Pension Reform**

	<i>Dependent Variable</i>				
	<b>Expected Pension Claiming Age</b>	<b>Retirement Age</b>	<b>Expected Probability of More-than-10% Drop in Public Pension Benefit</b>	<b>Expected Replacement Ratio</b>	<b>Expected Amount of Public Pension Benefit</b>
<i>Independent Variables</i>	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>	<b>(5)</b>
<b>EPI × Reform Year × 2nd Quarter Dummy</b>	1.170 ** (0.457)	0.430 (1.759)	-6.310 (9.848)	0.914 (1.487)	-35.247 (26.973)
<b>EPI × Reform Year × 3rd Quarter Dummy</b>	1.178 ** (0.451)	-0.996 (1.520)	-10.556 (9.021)	0.544 (1.451)	-57.208 * (29.456)
<b>EPI × Reform Year × 4th Quarter Dummy</b>	1.068 ** (0.445)	0.145 (1.346)	3.153 (8.275)	1.116 (1.805)	17.933 (25.542)
<b>N</b>	2806	1270	1148	701	977

Note: All regressions include indicators for missing variables. All regression control for age, education (high school or less, junior college, university or over), female, marital status (never married, divorced, widowed), health status (self-rated health excellent/very good, poor/fair), working for pay, number of years worked, asset, household income, chance to survive until age 75 divided by life table probability, region, and year. Robust standard errors are in parentheses. \*Significant at 10%; \*\*significant at 5%.

**Table 6: Estimates of Public Pension Expectations on Log of Final Savings Goals**

Independent Variables	<i>Dependent Variable: Log of Final Savings Goals</i>				
	<b>OLS</b>	<b>OLS</b>	<b>OLS</b>	<b>IV</b>	<b>IV</b>
	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>	<b>(5)</b>
<b>Expected Probability of More-than-10% Drop in Public Pension Benefits</b>	0.0117 ** (0.0054)	0.0062 (0.0047)	0.0069 (0.0050)	0.0055 (0.0047)	0.0065 (0.0048)
<b>Don't Know: Expected Probability of More-than-10% Drop in Public Pension Benefits</b>	0.6797 ** (0.2159)	0.6372 ** (0.2324)	0.5345 ** (0.2683)	0.6049 ** (0.2259)	0.5233 ** (0.2588)
<b>Expected Pension Claiming Age</b>		-0.0218 (0.0475)	-0.0268 (0.0493)	0.1417 (0.1503)	0.0656 (0.1431)
<b>Expected Replacement Ratio</b>			-0.0077 (0.0171)		-0.0122 (0.0172)
<b>Report: Expected Replacement Ratio</b>			-0.2481 (0.2368)		-0.2038 (0.2452)
<b>N</b>	0.6393	0.6569	0.6672	0.6494	0.6649
<b>R<sup>2</sup></b>	789	686	644	686	644

Note: All regressions include indicators for missing variables. All regression control for age, education (high school or less, junior college, university or over), female, marital status (never married, divorced, widowed), health status (self-rated health excellent/very good, poor/fair), working for pay, number of years worked, asset, household income, chance to survive until age 75 divided by life table probability, region, and year. The IV estimates use the pension reform variables as instruments for the expected pension claiming age. Robust standard errors are in parentheses. \*Significant at 10%; \*\*significant at 5%.