Public Pension Benefits Claiming Behavior:
New evidence from the Japanese Study on Aging and Retirement

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Abstract

This paper explores the public pension claiming behavior of the Japanese. First, we perform financial simulations and estimate the expected utility, depicting the typical patterns of pension benefits in a lifecycle model. We show that the optimal retirement age depends on the beneficiaries' mortality risk, discount rate, initial wealth, and risk attitude. Second, we use individual-level data from the Japanese Study on Aging and Retirement to examine empirically the determinants of the take-up timing. We find supportive evidence that most of the factors examined in the simulation are indeed significantly associated with early claiming of pension benefits for wage earners.

Keywords: Claiming behavior; Pension benefit; Survival probability; Risk attitude; Japanese Study on Aging and Retirement

JEL Classification Codes: H55, J26

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1. Introduction

This paper explores the pension benefits claiming behavior of the Japanese and aims to contribute to the empirical analysis of the dynamic decision making process in a life cycle model and an aspect of labor supply behavior of the elderly. The Japanese public pension programs have their normal eligibility ages for most of their beneficiaries to start receiving pension benefits. At the same time, the beneficiaries can claim a flat-rate component of their benefits at non-normal ages between 60 and 70. In fact, not all the beneficiaries start enjoying their benefits at eligibility, with a nontrivial proportion of them claiming benefits at ages other than their normal eligibility age. According to the latest data published by the Japanese government, in FY 2007 (see below), 20–40 percent of the beneficiaries claimed reduced benefits earlier than their eligibility ages, and 1–3 percent claimed incremental benefits later. Having different claiming ages other than the normal retirement age is not unique to Japan, because the distribution of claiming ages depends on the institutional features of each country. For example, "twin peaks" in the distribution of retirement ages at 62 and 65 are widely known in the United States, where the eligible participants may claim their benefits any time between ages 62 and 70.

The mix-up of persons claiming pension at their normal and non-normal retirement ages casts doubts on the prevailing assumptions in the literature on the relationship between pension benefits and the labor supply/retirement behavior, namely, that individuals claim their benefits as soon as they become eligible. In contrast, forward-looking individuals can choose to receive either smaller benefits by claiming earlier or larger benefits by claiming later. Thus, the endogenous take-up decision is a worthwhile subject for an in-depth and independent investigation, which could overcome the weakness of previous literature, which probably misstated the incentives to take-up benefits, ignoring the endogeneity of the

claiming time.

However, the take-up decision of social security benefits, i.e., the timing of claiming pension benefits and its determinants, remains largely unexplored. To our knowledge, only a limited number of related studies have analyzed this issue. Among them, Coile et al. (2002) was a pioneering study that empirically examined the dynamic take-up decision and argued that retirement is not necessarily concurrent with claiming. The study explored the financial computations and simulations, revealing that delaying a claim after the eligibility age is optimal in many cases and that the gain from delaying is large. They also performed empirical estimations to show that the ratio of males who delayed claiming is in fact much smaller than that predicted by simulation, and that the pattern of claiming is significantly associated with individual characteristics such as life expectancy, wealth, and spousal age.

There are two other closely related studies that deal with the time to claim social security benefits. First, Hurd et al. (2004) examined the effect of one's subjective survival probability on claiming. They found that individuals with a very low subjective survival probability are inclined to retire and claim earlier than those with a higher probability. However, the effect is not large, and a substantial proportion of individuals claim as soon as they are eligible. Second, Brown et al. (2011) took a different approach to highlight the "framing effect," showing that the manner of framing a claim matters. They argued that some beneficiaries do not make fully rational and optimizing choices when choosing a claiming date, showing that the minimum number of years one would have to live to optimize benefits has a strong motivational impact on early claiming.[1]

The current study provides new evidence on the take-up decision of public pension benefits, empowered by the Japanese Study on Aging and Retirement (JSTAR), a Japanese

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[1] Brown et al. (2011) also showed that individuals delay the timing to claim when later claiming is framed as a gain and when the information provides an anchoring point at older ages. Moreover, they observed that females, individuals with credit card debt, and workers with lower expected benefits are more strongly affected by framing.

counterpart of the Health and Retirement Study (HRS), English Longitudinal Survey on Ageing (ELSA), Survey on Health, Aging and Retirement in Europe (SHARE), and other family surveys. The purpose of this paper is providing new empirical evidence in Japan on this issue and contributing to the existing literature in some innovative aspects by taking advantage of JSTAR, which contains a rich variety of information in the sample not quantified in previous studies. As discussed in Section 3, we hypothesize that early claimers are more myopic, perceive a lower survival probability, and/or are more risk averse. We test these hypotheses by utilizing data collected from JSTAR, which provides information on the subjective discount rate, survival probability, and risk attitude of beneficiaries based on an experimental design. Another reasonable hypothesis is that early claimers face liquidity constraints; they may need the benefits immediately to pay off their living expenses. JSTAR directly asks the respondents about their financial and non-financial wealth and measure of liquidity constraints. Thus, we explicitly examine how one's claiming decision is associated with a rich set of individual attributes, including one's subjective survival probability, patience, risk attitude, wealth, and liquidity constraints.

This paper proceeds as follows. Section 2 provides a brief overview of the Japanese public pension program, focusing on the timing to claim benefits. Section 3 explores some theoretical considerations that affect the take-up decision for testing and performs some financial calculations to obtain the optimal timing to claim. Section 4 performs empirical investigations using individual-level data from JSTAR. Section 5 concludes.

2. Institutional background

This section focuses on some features of the Japanese institutional background. The Japanese public pension program comes in three forms: (i) the National Pension Insurance (NPI, *Kokumin Nenkin*) program for the self-employed, (ii) Employee's Pension Insurance (EPI,

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Kosei Nenkin) program for private company employees, and (iii) Mutual Aid Insurance (MAI,

Kyosai Nenkin) program for employees in the public sector and in private schools. Since

1961, it is mandatory for the Japanese to be a member of any one of the programs. The NPI

and EPI programs share nearly one half each of the population insured by the programs, with

the MAI covering only a small portion. In addition, the contribution-benefit structure of MAI

resembles that of EPI in most aspects, and so we focus on the claiming behavior of the NPI

and EPI groups as the core pension programs in Japan (Oshio et. al., 2010).[2]

Figure 1 provides a bird's-eye view of the early and delayed claiming rules in the

programs. NPI has a flat-rate benefit only, and since 1961, the eligibility age has been set at

65 for both males and females. Each beneficiary's monthly monetary contribution is fixed,

and the benefit for an eligible individual depends on the years of contribution. The minimum

years of contribution is 25, with the monthly benefit for the fully insured (40 years of

contribution) being about 66,000 yen (about 800 dollars).[3] While the normal eligibility age is

set at 65, the NPI program allows a ten-year window for claiming benefits after the ages of 60

and 70. If an individual claims before age 65 (*Kuriage Jukyu*), i.e., between ages 60 and 64,

he or she undergoes a benefit reduction, and if an individual claims after age 65, i.e., between

ages 66 and 70 (*Kurisage Jukyu*), he or she enjoys incremental rewards. For those born after

April 2, 1941, the actuarial reduction rate before age 65 is 0.5 percent per month and actuarial

increment rate after age 65 is 0.7 percent per month (Table 1). For example, if one claims at

age 60, the benefit is equal to 70 (100 – 0.5×12×5) percent of the amount that one would

claim at age 65, and if one claims at age 70, the benefit is equal to 142 (100 + 0.7×12×5)

percent of the normal benefit. The reduction/increment rates are different for those born

before and after April 2, 1941, with the actuarial adjustment rates being higher for the former

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[2] One difference between EPI and MAI is that earning tests apply to the benefits of EPI, but not MAI. Benefit reduction from the earnings test is not compensated by higher benefits in later years through actuarial adjustment in Japan, but is compensated in the United States.

[3] Some options provide for individuals who contributed to the NPI program for less than 25 years to satisfy the minimum years of contribution.

than for the latter.[4] Once claimed, one cannot change the take-up decision later.[5]

Meanwhile, the EPI program has a two-tier structure consisting of two components, the flat-rate component and the wage-proportional component. The flat rate-component, referred to as the basic pension benefit since the 1985 reform, has the same contribution-benefit structure as the NPI program. The wage-proportional component is computed considering the career average monthly income (CAMI), months of contributions, and benefit multiplier, which varies by gender and birthday. The normal eligibility age for both components of the EPI are set at 65, which is the same for NPI beneficiaries; the benefits claimed at the normal eligibility age are the "normal benefits" of the EPI program. However, the EPI beneficiaries are entitled to receive "special benefits" before age 65. By this provisional measure, the EPI beneficiaries are de facto entitled to receive benefits before the age of 65 even if they do not claim early. The special benefit includes the flat-rate component and the wage-proportional component, similar to the normal benefits.[6]

The normal eligibility age to receive special benefits differs between males and females and between the flat-rate component and the wage-proportional component. For males, the age to claim both the components was 60 between 1973 and 2000, but the age to claim the flat-rate component has been extended by one year every three years, to age 65 in 2013: 61 in 2001-2003, 62 in 2004-2006, 63 in 2007-2009, and 64 in 2010-2012. The age to claim the wage-proportional component will be extended after 2013. For females, the age to claim the

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[4] Another difference between individuals who were born before and after April 2, 1941, is that the latter group claim their benefits on a monthly basis while the former claim on a yearly basis. In the United States, there is an actuarial reduction in benefit of 5 to 9 percent for each month of claiming before age 65 (62–64), which is comparable to that for individuals born after April 1941 in Japan. Individuals claiming on their 62nd birthday have benefits equal to 80 percent of the Primary Insurance Amount (PIA). In contrast, the delayed retirement credit for those claiming after age 65 is only 1 percent per year for the respondents (Coile, et.al., 2002), which is smaller than the credit rate in Japan, generating a kink at age 65.

[5] Moreover, an NPI beneficiary is not entitled to basic disability pension if he or she becomes disabled after deciding on an earlier take up. Note that the earnings of NPI beneficiaries are not income tested.

[6] Strictly speaking, the flat-rate component is larger and the wage-proportional component is smaller in the special benefit than normal benefit. However, the sum of the flat-rate and the wage-proportional components is equal in both benefits for those EPI beneficiaries of long participation and no experience of being self-employed.

special benefit (both components) was 55 before 1986, but was extended by one year every three years, reaching 60 in 2000. Since 2006, the age to claim the flat-rate component has been extended by one year every three years: 61 in 2006-2008, 62 in 2009-2011, and 63 in 2012-2014.[7] Under this scheme, there is a small scope for the EPI beneficiaries to claim earlier than the NPI ones. As of 2007 and 2009, when the data we use below were collected, the eligibility age for the wage-proportional component was 60 for both males and females, and that for the flat-rate component was 63 for males and 61 (62) for females in 2007 (2009). In our sample, only males aged 60 to 62 and females aged 60 (to 61) in 2007 (2009) could claim the EPI flat-rate component of the special benefit earlier than their eligibility ages. Note that the EPI beneficiaries cannot make an early claim for their wage-proportional component because the eligible age is still set at 60.

EPI beneficiaries can also delay their claiming and receive an incremental benefit after age 65.[8] One can delay either one's flat-rate component or wage-proportional component, and does not have to delay both components together. In our simulation, however, we assume that one chooses to delay claiming the flat-rate component only (and receive the wage-proportional component at the normal retirement age). This assumption makes it easy for us to compare the impact of delayed claiming with that of early claiming, in which one receives the wage-proportional component regardless of one's choice.

To make matters more complicated, the EPI program has two types of early claiming, "total early claiming" (*Zenbu Kuriage*) and "partial early claiming" (*Ichibu Kuriage*). In the case of total early claiming, one receives the flat-rate component of the normal benefit at a reduced rate, exactly as shown in Table 1, but is no longer entitled to receive the flat-rate component of the special benefit (note that they are still eligible for the wage-proportional

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[7] The age to claim the flat-rate component is fixed as 64 for 2015–2017 and 65 for 2018 later, and that to claim the wage-proportional component will be extended after 2018.

[8] EPI beneficiaries can delay claiming the main body of their EPI benefit, but not the special benefit that those aged below 65 are eligible for.

component). In the case of partial early claiming, one receives the reduced amounts of the flat-rate components of both the special benefit and formal benefit (as well as the wage-proportional component).[9] The flat-rate components of the special and normal benefits are almost the same if the duration of participating in EPI is long enough. In this case, partial early claiming is in general more advantageous than total early claiming. Hence, we assume that an EPI beneficiary chooses partial early claiming in our simulation if the claim is before the normal age.[10]

In sum, the NPI beneficiaries, who are eligible only for the flat-rate component, can claim the benefits due at the normal eligibility age of 65 early between ages 60 and 64 or late between ages 66 and 70. The EPI beneficiaries could claim their flat-rate component early between ages 60 and 63 for males and 60 and 62 for females as of 2009, and they could claim their wage-proportional component at the age of 60. Moreover, the EPI beneficiaries can claim both the components late between ages 66 and 70 (although we assume that they claim only the flat-rate component).

According to the Annual Report on Social Security Administration (*Shakai Hoken Jigyo Nenpo*) compiled by Japan's Social Security Agency, 74.6 percent of the initial beneficiaries in the NPI program claimed their benefits at the normal eligibility age of 65, receiving benefits worth 55,689 yen per month on average in FY 2007. Moreover, 22.9 percent claimed their benefits before age 65 (the average monthly benefit of 41,573 yen) and 2.6 percent claimed later (83,063 yen). The difference in claiming ages is observed for EPI beneficiaries too. While 59.4 percent of the initial beneficiaries claimed benefits at the normal eligibility age of 65, 39.6 percent claimed earlier and 1.0 percent claimed later. The proportion of early

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[9] More specifically, if a male EPI beneficiary chooses partial early claiming at age X ($60 \leq X \leq 62$), he receives (i) $[(1 - (63 - X)/(65 - X))] \times 100$ percent of the flat-rate component of the special benefit, and (ii) $[(63 - X)/(65 - X)] \times (1 -$ reduction rate (see Table 1)$) \times 100$ percent of the flat-rate component of the normal benefit, plus (iii) the wage-proportional component.

[10] Partial early claiming is not necessarily more advantageous than total early claiming if the flat-rate component of the special benefit is smaller than that of the normal component, which is the case for individuals who were self-employed for more than a period of time.

claimers in the EPI program was around 10 percent in FY 2004-2006, jumping to 40 percent in FY 2007, when the eligible age to claim the flat-rate component was raised from 62 to 63. Thus, official statistics confirm that a nontrivial proportion of individuals claim their benefit at ages other than their normal eligibility ages, and that an increasing portion of them are indeed motivated to claim earlier in response to the extended eligibility age for the flat-rate component.

3. Theoretical issues and simulations

In this section, we illustrate the incentives for claiming and perform some simulations. Under the Japanese public pension program, one is eligible to receive public pension benefits after reaching age 60. However, one's pension claiming decision depends on several important factors. The first one is life expectancy. A longer life expectancy provides an incentive to delay claiming, which is expected to raise future benefits. The second one is subjective discount rate (patience). Even if the total amount of pension benefit over the life course is the same, an individual with a higher discount rate (i.e., less patience) is more inclined to claim earlier. The third one is risk attitude. A more risk-averse individual is more likely to claim earlier to avoid a reduction in consumption. The fourth one is liquidity constraint. An individual under liquidity constraints, needing liquid financial resources immediately, is more inclined to claim earlier, even if claiming later would increase one's benefits.

In addition, one's family structure potentially matters for the claiming decision. Marital status may have mixed associations with benefit claiming. On the one hand, a married individual may not care much about pension benefits, because his or her spouse may provide insurance cover against mortality risk (Kotlikoff and Spivak, 1981). On the other hand, a married individual may be inclined to delay claiming, expecting higher values of future benefits and the spouse's survivor benefit. However, we do not explicitly consider one's

family structure in our simulation. While spousal (*Kakyu Nenkin*) and survivor (*Izoku Nenkin*) benefits complicate computations, they do not affect the basic pattern of the advantages of delayed claiming, because the amount and eligibility of spousal and survivor benefits are not affected by the spouse's claiming behavior.[11] It should be noted, however, that one cannot receive early-claiming benefits and survivor benefits simultaneously. This may reduce the incentive for early claiming, especially for women whose husbands expect higher benefits in future. We ignore this potential survivor benefit effect in our analysis.

Now, we turn to simulations to illustrate the incentive to claim benefits. We perform two sets of simulations, (i) financial calculations of the expected present discounted value (EPDV) of future streams of net benefits, and (ii) expected utility maximization under liquidity constraints. We focus on the sensitivities to life expectancy, earnings, and discount rate in financial calculations and on the importance of risk attitude and wealth level (or liquidity constraints) in expected utility maximization. Our simulation deals with only the flat-rate component for both the NPI and EPI beneficiaries, since EPI beneficiaries cannot claim their wage-proportional component early under the current eligible age. This makes the simulation results for both types of beneficiaries comparable.

The advantage of financial calculations of the future net benefit's EPDV is that they explore the variations in incentives for claiming for subgroups of the population with different characteristics. In this calculation, we set up a "typical" beneficiary, a male aged 60 (i.e., born between April 2, 1946, and April 1, 1947), whose CAMI is 360,000 yen, with 36 years of contribution. We consider two types of individuals, the EPI beneficiary and the NPI beneficiary, but ignore their marital and spousal status for simplicity. We further assume that they have retired normally, so we ignore their labor income. Under these assumptions, we

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[11] More specifically, EPI beneficiaries who are eligible for the special benefit can receive the flat-rate spousal benefit as long as the spouse is aged below 65, despite their claiming decision. The calculation of the survivor benefit is based on the spouse's CAMI and months of contributions, regardless of the timing of spouse's claiming.

examine how the EPDV of their public pension benefits varies with the age of claiming. For the base case, we assume that the discount rate is 2.5 percent and utilize the mortality rates in the *Simplified Life Table* of 2007 (released by the Ministry of Labor, Health, and Welfare) as mortality risk. We consider six cases in addition to the base case. For the high and low mortality risk cases, we assume that the mortality rate is 25 percent higher and lower, respectively, than in the base case. For the high and low discount rate cases, we assume that the discount rate is 4 percent and 1 percent, respectively. Finally, for the high and low earnings cases, we assume that CAMI is 25 percent higher and lower, respectively, than in the base case.

Table 2 presents the results of the financial calculations: the top panel for the EPI beneficiary and bottom panel for the NPI beneficiary. The third column shows the optimal age for claiming (r^*), at which the EPDV is maximized. The fourth to sixth columns report the EPDV values when one retires at the normal eligibility age (r^N)—63 for EPI and 65 for NPI beneficiaries—and at r^* as well as their difference. The seventh column shows the CAMI (equal to 360,000 yen except for the cases of high and low earnings). The last column shows the ratio of the gain from deviating from the normal eligibility age to CAMI.

The first row of the top panel for the base case shows that for the EPI beneficiary, it is optimal to claim benefits at age 66 instead of the normal eligibility age of 63. This delay raises the EPDV of the benefits by 72,000 yen, or 20 percent of CAMI. Similarly, the first row of the bottom panel shows that the optimal age to claim is 63, two years before the normal eligibility age of 65, for an NPI beneficiary. However, these results are sensitive to the assumed parameter values. The remaining rows of Table 2 present the results based on the alternative assumptions. First, a longer life expectancy leads to later claiming. The optimal age of benefit claiming is 61 (EPI beneficiary) or 64 (NPI beneficiary), with a 25 percent increase of mortality risk, while it rises to 69 with a 25 percent decrease of mortality risk for

both NPI and EPI/MAI beneficiaries. Second, a higher discount rate encourages early claiming. The optimal age to claim is 60 (EPI beneficiary) or 62 (NPI beneficiary) if the discount rate increases to 4 percent, while the claiming is delayed until age 68 if the rate is zero for both cases. Third, different levels of earnings do not affect systematically the timing of claiming for both EPI and NPI beneficiaries.

Figures 2 and 3 present the base cases of the EPDV of benefits by claiming age of the flat-rate component for EPI and NPI beneficiaries, respectively. Both the figures show that there are two peaks before and after age 65, reflecting the different actuarial adjustment rates before and after 65 (e.g., 0.5 percent for actuarial reduction before age 65 and 0.7 percent for actuarial increment after age 65 for those born after April 2, 1941). These actuarial adjustment rates are likely to construct two EPDV peaks, and their relative heights are sensitive to the discount rate as well as mortality risk. As stated above, a higher discount rate and/or higher mortality risk tends to raise the height of the left peak, implying that early claiming is advantageous for beneficiaries.

Next, we turn to the second simulation of expected utility maximization under liquidity constraints. We aim to capture the value of public pension as a real annuity to a person risk averse and uncertain of death date. We assume that individuals vary their annuity holdings on the margin by delaying their claiming, leading this discussion to the inclusion of the discount rate and survival probabilities in how to evaluate marginal annuity. This simulation complements the financial calculation that understates the gains from delays for risk-averse individuals. The result presented below shows how the inclusion of risk attitudes affects the length of optimal delays and gains from delay. In addition, this simulation enables us to explore the effect of liquidity constraints on the claiming decision.

In what follows, we compute the expected utility maximization model. Following Coile et al. (2002), we use a CRRA specification of the instantaneous consumption utility function.

There are three new parameters: the utility discount rate, coefficient of relative risk aversion, and initial wealth level. We assume that the utility discount rate is equal to 2.5 percent as in the financial calculations case. We consider two levels of risk aversion for CRRA: one and three. A CRRA of one corresponds to log utility. Finally, we consider four levels of initial wealth: 1, 3, 5, and 7 million yen. We assume that one has no other income and cannot borrow against public pension benefits, but must consume from financial wealth until starting to receive the benefits. We further assume that one consumes the same amount, equal to the amount one can keep on consuming until death, every year before claiming. We conduct the simulations only for EPI beneficiaries, because the NPI benefit is too low to finance one's entire consumption.

Table 3 presents the simulation results. The third and fourth columns show the optimal ages to claim under financial calculations (r^*) and expected utility maximization (r^{**}). The following three columns compare the wealth equivalents when one claims at ages r^N, r^*, and r^{**}. The wealth equivalent is the amount of wealth that one requires to be made today as well as amount one is entitled to from the stream of benefit. The final column shows the changes in wealth equivalent from choosing the optimal age to claim, considering utility maximization rather than normal eligibility age (r^N).

This table provides three interesting results. First, as expected, the optimal age to claim increases monotonically as one's wealth rises. Under a CRRA of one, the optimal age to claim increases from 61 to 70 as one's wealth rises from 1 to 7 million yen. In the same way, the optimal age to claim increases from 60 to 68 under a CRRA of three. Second, the optimal age to claim is lower for one with a higher risk aversion regardless of the level of wealth, because one with a higher risk aversion is more inclined to avoid a low level of consumption. Third, if one's wealth level is low, one tends to claim earlier than suggested by financial calculations. For example, if one's wealth is as low as 1 million yen, it is advantageous to

claim at age 61 rather than at age 66, which is the optimal age under financial calculations. This is because a low level of consumption under tight budget constraints due to low wealth reduces one's utility and encourages early claiming, especially for those with higher risk aversion. The financial calculations shown in Table 2 do not capture this incentive mechanism.

The simulation results presented in Tables 2 and 3 are generally consistent with those in Coile et al. (2002). Higher mortality risk, higher discount rates, higher liquidity constraints (or lower initial wealth), and more risk aversion tend to lead to earlier claiming of the flat-rate component. These results are in line with expectations as well. At the same time, we notice some differences in the United States and Japan. Coile et al. (2002) showed that delayed claiming after the normal retirement age is optimal in a wide variety of cases in the United States. In contrast, we recognize that the optimal age to claim in Japan is potentially distributed over a wide range from 60 to 70 under the Japanese pension programs. We conclude that in Japan it can be advantageous to claim benefits both before and after the normal eligibility age depending on a combination of related parameters. In addition, a higher actuarial adjustment (credit) rate after one's eligibility age tends to make early and delayed claiming comparable in some cases.

To be sure, official statistics show that a nontrivial proportion of EPI and NPI beneficiaries claim before their normal eligibility ages, suggesting that as a whole there are biases in the parameters, leading to early claiming. However, there should be substantial idiosyncrasies across individuals with different attributes. In the following section, we explore the cross-sectional associations between age to claim and individual characteristics, which are available from JSTAR, including individual preference to patience and risk attitude as well as subjective survival probability.

4. Empirical estimation

This section presents empirical evidence on the timing to claim pension benefits and the cross-sectional patterns observed empirically using the baseline data from JSTAR. JSTAR started collecting data in five municipalities in 2007 and performed the second survey for those respondents in 2009. Moreover, JSTAR added two new municipalities in 2009.[12] The sample in the baseline (five municipalities in 2007 and two in 2009) consists of respondents aged 50 to 75 and randomly chosen from household registration after regional stratification in each municipality. The total sample size is about 5,760.

We perform two sets of empirical analyses. First, we preview the claiming behavior in Japan with a question regarding respondent's attitude toward early/delayed claiming (non-normal claiming), measured uniquely in JSTAR. Second, we perform a probit analysis to examine the timing of claiming. In what follows, we merge the MAI and EPI beneficiaries since the institutions are similar.

JSTAR explicitly asked the respondents whether they knew about early or late claiming as follows (below is the case of early claiming):

The basic public pension includes an early withdrawal option to begin receiving pension at a younger age than originally specified, but the amount the recipient receives annually is reduced. Are you familiar with this system?

1. Yes   2. No   3. Refused to answer

JSTAR further asked the respondents whether they claimed (or will claim) benefits earlier or later for three different age groups (below is the case of early claiming for those aged less than 60):

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[12] See Ichimura et al. (2009) for a detailed description of JSTAR. JSTAR contains a variety of variables comparable to HRS/ELSA/SHARE and can address a variety of socio-economic issues related to the aging population with emphasis on both interdisciplinary and international comparability.

For the basic public pension, if you begin receiving pension at age 60 and were born on or before April 1, 1941, you would receive 58 percent of the amount you receive if you waited until age 65 to begin receiving the pension. If you were born on or after April 2, 1941, you would receive 70 percent of the amount you receive if you waited until age 65 to begin receiving the pension. Once you make the choice, you cannot change your decision. Do you intend to take this early withdrawal option?

1. Yes   2. No   3. Don't know   4. Refused to answer[13]

Table 4 summarizes the results from the reported answers to these questions regarding early claiming (left) and late claiming (right). We use all the samples that answered the questions (regardless of actual claiming behavior) about the experience of claiming and claiming age when already claimed. We observe several interesting findings from the table. First, more than 80 percent of the respondents are familiar with the system of early claiming. The proportion of those who know about the system is highest for male EPI/MAI beneficiaries (82 percent) and lowest for male NPI beneficiaries (78 percent). The proportion of respondents who know about the system of late claiming is lower (65 percent) than that of early claiming, and is highest for female NPI beneficiaries (67 percent) and lowest for male NPI beneficiaries (62 percent).

Second, the proportion of early claimers is nontrivial. For respondents aged less than 60, the proportion of those willing to claim early in future is 17 percent on average and highest for EPI/MAI beneficiaries, both male and female (20 percent). For respondents aged 60–64, the proportion of early claimers, both those who will claim and those who have already claimed, is 27 percent, and is highest for male NPI beneficiaries (30 percent) and lowest for

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[13] A full set of the related questions is available upon request from the author.

male EPI/MAI beneficiaries (24 percent). For respondents aged 65 and over, the proportion of those who have claimed earlier is 28 percent, and is highest for female EPI/MAI beneficiaries (20 percent), followed by male NPI beneficiaries.

Third, the proportion of late claimers is much lower than that of early claimers. For respondents aged less than 60, the proportion of those willing to claim late is highest for male NPI beneficiaries (12 percent) and 5–7 percent for other groups. For respondents aged less than 60–64, the proportion of late claimers is 6–8 percent for all groups. For respondents aged 65 and over, the proportion of late claimers is about 4 percent, and is slightly higher for male EPI/MAI beneficiaries. These figures are roughly consistent with the official statistics referred to in the last section.

Fourth, a non-negligible portion of the respondents have no idea whether to claim early or late (or do not know whether they have claimed). A quarter of the respondents aged less than 60 are indecisive of early/late claiming, while the proportion declined to 13–16 percent for those aged 60–64 and to 5–7 percent for those aged 65 and over.

We move on to regression analysis. We confine the sample to those who claimed pension benefits between ages 60 and 70 to examine their actual behavioral response, which differs from those in Table 4. We further limit the sample to those who claimed between ages 60 and 65, because the number of those who actually claimed between ages 66 and 70 is negligible in the sample.[14] In other words, we focus on the take-up decision of early claimers. We categorize the respondents into early claimers and normal claimers (i.e., those who claimed at the eligible age) based on their claiming age, not on their response to the questions regarding early/late claiming shown in Table 4. We perform a probit analysis to regress a dummy variable on a set of variables, focusing on the factors discussed in the previous section, separately for gender and type of pension (NPI vs. EPI).

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[14] We also remove those who claimed before age 60 so as to exclude claiming disability or survivor pension benefits and other unusual cases.

The dependent variable is a binary variable that takes the value of one for early claimers and zero for normal claimers. Based on the institution described in Section 2, the NPI beneficiaries are categorized into early or normal claimers depending on their claiming age; the early claimers claimed between ages 60 and 64, while the normal ones claimed at age 65. The same categorization does not work for EPI/MAI beneficiaries, because JSTAR does not ask the claiming ages separately for the flat-rate and wage-proportional components. For example, even if an EPI/MAI beneficiary claimed at age 60, one might be both "normal" in claiming the second-tier component (the normal eligible age is 60) and "early" in claiming the first-tier component (the normal eligible age is over 60). Hence, we define an individual satisfying the following three conditions as an early claimer in EPI/MAI: (i) one identifying oneself as an early claimer (see Table 4), (ii) whose claiming age was less than the eligible age for the flat-rate component—60 to 62 for males and 60 to 61 (60–62) for females in 2007 (2009), and (iii) whose age in 2007 was less than 67 (males) or 62 (females), considering that the early claiming program was not applicable to those older than these ages. A normal claimer for EPI/MAI benefits is defined as one not identified as an early claimer under the same age range.

Table 5 presents the summary statistics of the variables. We observe several noteworthy facts. The proportion of early claimers, indicated by the mean of the early dummy, is higher for NPI (about 40 percent) than EPI/MAI (31 percent) beneficiaries, and slightly higher for males than females within the same pension programs. Turning to demographics, the respondents' average age is close to 70 for NPI beneficiaries and from 60 to 65 for EPI/MAI beneficiaries. Males are more likely to have a spouse than females, and on average the spouse is younger for males and older for females than the respondents by 3 to 4 years. The educational attainment is higher for males than females and higher for EPI/MAI beneficiaries than NPI ones. The share of lower qualification (junior high school graduates) is close to 60

percent for male NPI beneficiaries, followed by female NPI beneficiaries (52 percent), which is higher than that of their EPI/MAI counterparts (26 percent). The share for middle qualification (senior high school graduates) is larger for females than males and for EPI/MAI beneficiaries. The proportion of high qualification (two-year college graduates or higher) is the highest for male EPI/MAI beneficiaries.

Moreover, the net wealth level, defined as the sum of financial (deposits, securities, and stocks) and non-financial (real estate) assets minus liabilities (either mortgage or non-mortgage), is divided into quartiles, and an indicator variable is allocated to each quartile since the distribution of net wealth is skewed.[15] The share of the first quartile is highest for NPI beneficiaries, while the share of the fourth quartile is highest for male EPI/MAI beneficiaries and lowest for female NPI beneficiaries. The subjective probability of living up to 80, which is about 60 percent, is higher for females than for males. JSTAR asks about the probability to live up to the various five-year age intervals between 75 and 120, and the probability to live up to age 80 is shown the most diverse across individuals (Hurd et al. 2004).[16] Moving on to individual preferences, the subjective discount rate (patience) measured by an experimental instrument in JSTAR seems to be larger for males. The most prevalent discount rate is 0 or 0.1 or 0.5 percent, followed by 1 or 2 or 6 percent, except for male EPI/MAI beneficiaries.[17] A substantial portion of the respondents did not disclose their

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[15] In addition to wealth level, JSTAR asks explicitly about one's liquidity condition following Jappelli et al. (1998) to identify those facing liquidity constraints. The share of individuals facing liquidity constraints is only 4 percent partly because of their age range (i.e., 50–75), and most of the respondents answered that they do not need to borrow. We do not include the actual or expected amount of public pension benefits in the analysis because of the possibility of substantial error.

[16] The wording of the question is, "This chart shows the average life expectancies from now for Japanese men and women at age 70. For example, of 100 men, 85 will live to age 75, while 93 women will. Please tell me the likelihood you will live to the following ages." A respondent is asked to report his/her probability to live up to every five-year interval, beginning from age 75 up to age 120. See the Research Institute of Economy, Trade and Industry and Hitotsubashi University (N.D.) for details.

[17] The corresponding question is, "I will ask you to choose between two options: receiving one million yen one month from today, or receiving a different sum thirteen months from today. There is no chance that you would not receive either sum. The alternative starts with, "1. Receive 1 million yen one month from today" and "2. Receive 950,000 yen 13 months from today (interest rate difference: -5 percent)." In the following questions, the interest rate difference will be 0 percent, 0.1 percent, 0.5 percent, 1 percent, 2 percent, 6 percent, 10 percent, 20 percent, 30 percent, and 40 percent in the final question. We removed those individuals who chose

discount rate, so we construct a dummy variable in the estimation to indicate the group whose

discount rate is not available. On the other hand, the beneficiaries' risk attitude, obtained

through experimental "income gamble" questions in JSTAR, is slightly different between

males and females. It is common that the dominant group prefers a certain choice (no risk) to

any other choices with uncertainty except for male EPI beneficiaries. Similar to the subjective

discount rate, a substantial proportion did not reveal their risk attitude. We deal with them

separately by creating a dummy variable in the estimation.[18]

Table 6 shows the estimation results of the probit model in terms of marginal effects. The

dependent variable is a dummy for early claimers. We run regression analysis separately for

males and females and for NPI and EPI/MAI beneficiaries. First, we examine the results for

male beneficiaries. For NPI male beneficiaries, the coefficient on age is negative and

significant, indicating that younger males are less likely to claim early. This may reflect the

cohort effect; older generations are more likely to claim early, consistent with official

statistics. Males with spouse are more likely to claim early, and those with a higher wealth

level or higher probability to survive age 80 are less likely to do so, although their

coefficients are not statistically significant. The coefficients on the subjective discount rate or

risk attitude are not significant.

For male EPI/MAI beneficiaries, those younger are significantly less likely to claim early,

as in the case of NPI beneficiaries. Males with higher educational attainment are significantly

less likely to claim early. Moreover, males with larger net wealth (the 4th quartile) and higher

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2 in the first question, since this is apparently inconsistent. See the Research Institute of Economy, Trade and Industry and Hitotsubashi University (N.D.) for details.

[18] The corresponding question is, "If the method by which you are paid at work were to change only for next month, which of the following options would you prefer? Please assume that the increase of your pay is not related to your ability or effort, and that this change will be in effect for next month only. This question is not related to whether you are actually working, or whether this would actually happen at the company you work at. This is just a hypothetical question. The first set of choices are, "1. 50 percent gain in your payment for certain" and "2. 10 percent gain in your payment for certain." In this question, everyone is expected to choose 1, and thus the respondents who chose 2 are excluded in the estimation. The following questions provide a set of choices: "1. X percent change to have 50 percent gain, and (100-X) percent change to have 5 percent gain"; and "2. 10 percent gain for certain." X takes 90 to 10 by 10 percent intervals, which makes 10 response levels of risk preference.

survival probability are significantly less likely to claim early, in line with our expectations. In addition, males with less patience (whose subjective discount rate is between 10 and 40 percent) are significantly more likely to claim early, again consistent with our expectations. The risk attitude coefficients are not significant.

For female beneficiaries, the results for NPI beneficiaries resemble those for their male counterparts. Younger females are less likely to claim early. In addition, females with spouse are more likely to claim early, while they are less likely if the husband is younger. The coefficients on net wealth or survival probability, subjective discount rate, and risk attitude are not significant.

The results for female EPI/MAI beneficiaries are again similar to those for their male counterparts. The coefficients on age and educational attainment were positive, unlike in the case of males, but these are not significant. The coefficients on the net wealth (3rd quartile) and survival probability are negative and significant, indicating that females are less likely to claim early if they have a larger amount of assets or higher probability to live up to age 80. Moreover, females with a higher subjective discount rate (less patience) are more likely to claim early, with a statistically significant coefficient on it. The coefficient on risk attitude is not significant.

These results show that most of the factors shown to be relevant to claiming behaviors in the simulation indeed matter in empirical estimation. In particular, the beneficiaries' net wealth level, survival probability, and subjective discount rates are significantly associated with their claiming behavior for EPI/MAI, in addition to age. The contrasting results between NPI and EPI/MAI beneficiaries are somewhat puzzling, however. One possible explanation is that compared to EPI/MAI beneficiaries, NPI beneficiaries are more heterogeneous, because they consist of self-employed workers, non-regular employees, and even those out of the labor force, while their attributes are not fully captured by the JSTAR questionnaire.

5. Concluding remarks

This paper explores the claiming behavior of public pension benefits in Japan, aiming to contribute to the analysis on dynamic decision making in a life cycle model and an aspect of labor supply behavior of the elderly. First, we perform some financial simulations and expected utility models to depict typical patterns of pension benefits over a life cycle. We show that the optimal retirement age depends on mortality risk, discount rate, initial wealth, and risk attitude. Second, we utilize the data collected from JSTAR to examine the determinants of take-up timing. We find that lower survival probability, higher subjective discount rate, and poorer liquidity condition encourage early claiming for wage earners. While this paper empirically reveals some important elements in claiming decisions, future research should refine the variables used in the analysis and characterize the behavioral elements in receiving public pension benefits, thereby contributing to redesigning the public pension policy.

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http://www.rieti.go.jp/en/projects/jstar/data/jstar_2007_1st_a-k-s-s-t_capi.pdf

Table 1 Timing of claim and benefit relative to age 65

Age to claim	Relative to the benefits at age 65	Age to claim	Relative to the benefits at age 65
64	94% (89%)	66	108.4% (112%)
63	88% (80%)	67	116.8% (126%)
62	82% (72%)	68	125.2% (143%)
61	76% (65%)	69	133.6% (164%)
60	70% (58%)	70	142% (188%)

Note: The proportion of benefits at each age out of the benefit at age 65 for individuals who were born after April 2, 1941.

The figures in the parentheses refer to those for individuals who were born before April 2, 1941.

Table 2. Financial calculations

	Assumptions	Optimal age for benefit claim ($r*$)	EPDV (thousand yen)			CAMI (thousand yen)	Difference in EPDV/ CAMI (between r^N and r^*)
			If one claims benefit at age		Difference		
			r^N	$r*$			
EPI beneficiary (Normal eligibility age r^N (= 63))							
Base case		66	29,566	29,638	72	360	0.20
High mortality risk	×1.25	61	27,557	27,658	100	360	0.28
Low mortality risk	×0.75	69	35,684	36,194	511	360	1.42
High discount rate	4%	60	25,206	25,402	196	360	0.55
Low discount rate	1%	68	35,257	35,574	317	360	0.88
High earnings	×1.25	66	34,502	34,574	72	450	0.16
Low earnings	×0.75	66	24,629	24,701	72	270	0.27
NPI beneficiary (Normal eligibility age r^N (= 65))							
Base case		63	8,554	8,638	84	360	0.23
High mortality risk	×1.25	63	7,814	7,977	163	360	0.45
Low mortality risk	×0.75	69	10,824	11,335	511	360	1.42
High discount rate	4%	62	6,997	7,251	254	360	0.71
Low discount rate	1%	68	10,607	10,924	317	360	0.88
High earnings	×1.25	63	8,554	8,638	84	450	0.19
Low earnings	×0.75	63	8,554	8,638	84	270	0.31

For calculations, we assume a male who was born between April 2, 1946 and April 1, 1947, with career average of monthly income (CAMI) being equal to 360,000 yen and years of contribution being equal to 36 years. Spousal and bequest motives are not considered.

Table 3. Expected utility maximization: EPI beneficiary   (Normal eligibility age (r^N) = 63)

CRRA Relative risk aversion	Wealth (thousand yen)	Financial optimal age for benefit claim ($\overset{*}{r}$)	Exp. utility optimal age for benefit claim ($\overset{**}{r}$)	Wealth equivalent (thousand yen) If one claims benefit at age			Change in wealth equiv./ CAMI (between r^N and r^{**})
				r^N	r^*	r^{**}	
1	1,000	66	61	29,395	29,482	29,535	0.39
	3,000	66	67	29,870	30,287	30,326	1.27
	5,000	66	69	30,311	31,049	31,300	2.75
	7,000	66	70	30,724	31,774	32,419	4.71
3	1,000	66	60	32,452	32,195	33,564	3.09
	3,000	66	65	33,388	33,548	33,643	0.71
	5,000	66	67	34,163	34,724	34,734	1.58
	7,000	66	68	34,811	35,748	36,052	3.45

Table 4 Distribution of claiming age

(1) Acknowledgement

Early claiming	Total	Male		Female		Late claiming	Total	Male		Female	
		NPI	EPI/MAI	NPI	EPI/MAI			NPI	EPI/MAI	NPI	EPI/MAI
Know	80.5%	77.7%	81.7%	80.3%	80.4%	Know	64.5%	61.8%	65.0%	66.7%	63.5%
Don't Know	19.0%	21.7%	18.0%	18.8%	19.2%	Don't Know	35.0%	37.7%	34.8%	32.5%	36.2%
Refused to Answer	0.5%	0.6%	0.2%	0.8%	0.4%	Refused to Answer	0.5%	0.5%	0.2%	0.8%	0.3%

(2) Action/Intension

Aged under 60	Total	Male		Female		Aged under 60	Total	Male		Female	
		NPI	EPI/MAI	NPI	EPI/MAI			NPI	EPI/MAI	NPI	EPI/MAI
Will Claim Early	17.4%	13.1%	20.4%	15.7%	19.6%	Will Claim Late	6.5%	12.1%	6.3%	4.6%	6.7%
Won't Claim Early	57.0%	57.5%	54.0%	59.8%	54.9%	Won't Claim Late	65.1%	54.2%	65.8%	66.5%	67.2%
Don't Know	25.3%	29.0%	25.6%	24.1%	25.3%	Don't Know	28.2%	33.6%	27.8%	28.4%	26.1%
Refused to Answer	0.3%	0.5%	0.0%	0.4%	0.2%	Refused to Answer	0.2%	0.0%	0.0%	0.4%	0.0%

Aged 60-64	Total	Male		Female		Aged 60-64	Total	Male		Female	
		NPI	EPI/MAI	NPI	EPI/MAI			NPI	EPI/MAI	NPI	EPI/MAI
Have Claimed Early	19.4%	21.3%	16.0%	20.6%	19.3%	Will Claim Late	7.2%	7.4%	8.0%	6.3%	6.0%
Will Claim Late	7.8%	8.4%	8.4%	6.4%	6.9%	Won't Claim Late	75.7%	72.3%	76.5%	76.4%	80.5%
subtotal	*27.2%*	*29.7%*	*24.4%*	*27.0%*	*26.2%*	Don't Know	16.3%	19.6%	14.9%	16.0%	12.4%
Won't Claim Early	59.1%	55.5%	62.6%	60.4%	59.7%	Refused to Answer	0.9%	0.7%	0.6%	1.3%	1.0%
Don't Know	13.0%	14.2%	12.9%	11.8%	12.8%						
Refused to Answer	0.7%	0.6%	0.0%	0.7%	1.3%						

Aged 65 and over	Total	Male		Female		Aged 65 and over	Total	Male		Female	
		NPI	EPI/MAI	NPI	EPI/MAI			NPI	EPI/MAI	NPI	EPI/MAI
Have Claimed Early	17.7%	19.2%	16.7%	17.0%	20.1%	Have Claimed Late	4.3%	3.4%	5.9%	3.5%	4.2%
Won't Claim Early	77.3%	74.9%	77.4%	79.1%	74.9%	Won't Claim Late	89.8%	90.4%	86.5%	92.1%	89.8%
Don't Know	4.8%	5.2%	5.6%	3.7%	5.0%	Don't Know	5.6%	5.8%	7.3%	4.1%	5.5%
Refused to Answer	0.3%	0.7%	0.3%	0.2%	0.0%	Refused to Answer	0.4%	0.3%	0.3%	0.3%	0.5%

(Note) The authors' calculation is using JSTAR 1st wave. The sample includes an individual who responded to the questions regarding early/late claiming but not to some variables in Table 5.

Table 5 Summary statistics

	Male				Female			
	NPI		EPI/MAI		NPI		EPI/MAI	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Early dummy (*)	0.41	-	0.31	-	0.38	-	0.31	-
Age (2007)	69.59	3.59	63.59	1.83	69.44	3.54	61.49	1.64
Spouse (*)	0.87	-	0.91	-	0.79	-	0.85	-
Spouse's age	66.14	5.16	60.00	3.98	72.32	5.17	65.00	3.81
Qualification_low (*)	0.59	-	0.26	-	0.52	-	0.26	-
Qualification_middle (*)	0.29	-	0.45	-	0.37	-	0.54	-
Qualification_high (*)	0.12	-	0.29	-	0.10	-	0.19	-
Net wealth (1st quartile) (*)	0.25	-	0.21	-	0.25	-	0.20	-
Net wealth (2nd quartile) (*)	0.23	-	0.17	-	0.29	-	0.28	-
Net wealth (3rd quartile) (*)	0.23	-	0.29	-	0.24	-	0.25	-
Net wealth (4th quartile) (*)	0.28	-	0.33	-	0.21	-	0.28	-
Probability to live to 80 (*)	0.63	-	0.53	-	0.71	-	0.62	-
Discount rate (0% or 0.1%, or 0.5%) (*)	0.21	-	0.21	-	0.23	-	0.34	-
Discount rate (1% or 2%, or 6%) (*)	0.19	-	0.30	-	0.14	-	0.21	-
Discount rate (10%, 20%, 30%, or 40%) (*)	0.11	-	0.16	-	0.06	-	0.09	-
Discount rate (NA) (*)	0.49	-	0.33	-	0.57	-	0.35	-
Risk attitude (0% for uncertain) (*)	0.20	-	0.19	-	0.16	-	0.25	-
Risk attitude (10%, 20%, or 30% for uncertain) (*)	0.17	-	0.20	-	0.16	-	0.23	-
Risk attitude (40%, 50%, or 60% for uncertain) (*)	0.13	-	0.20	-	0.07	-	0.15	-
Risk attitude (70%, 80%, or 90% for uncertain) (*)	0.08	-	0.10	-	0.06	-	0.09	-
Risk attitude (NA) (*)	0.43	-	0.30	-	0.55	-	0.29	-
Number of observations	260		353		654		151	

(Note) In addition to the variables in the table, indicator variables to each municipality (total of 7 municipalities) are included in the estimation.

(*) denotes a binary variable, whose standard deviation is not shown.

Table 6 Probit estimation for early claimers

	Male						Female					
	NPI beneficiaries			EPI/MAI beneficiaries			NPI beneficiaries			EPI/MAI beneficiaries		
Coefficients	Marginal	S.E.		Marginal	S.E.		Marginal	S.E.		Marginal	S.E.	
Age (2007)	-0.036	0.010	***	-0.052	0.015	***	-0.034	0.006	***	0.011	0.029	
Spouse	0.066	0.184		-0.373	0.238		0.245	0.109	*	-0.558	0.900	
Spouse's age	-0.002	0.003		0.002	0.003		-0.004	0.002	**	0.006	0.014	
Qualification_low	-	-		-	-		-	-		-	-	
Qualification_middle	0.014	0.077		-0.114	0.068	*	-0.064	0.047		0.112	0.104	
Qualification_high	0.076	0.111		-0.177	0.065	**	-0.074	0.066		0.078	0.142	
Net wealth (1st quartile)	-	-		-	-		-	-		-	-	
Net wealth (2nd quartile)	0.008	0.097		-0.031	0.080		-0.043	0.055		-0.128	0.104	
Net wealth (3rd quartile)	0.090	0.096		-0.198	0.060	***	-0.058	0.058		-0.386	0.066	***
Net wealth (4th quartile)	-0.011	0.092		-0.189	0.065	***	-0.017	0.060		-0.164	0.100	
Probability to live to 80	-0.015	0.097		-0.183	0.074	**	-0.002	0.063		-0.255	0.123	**
Discount rate (0% or 0.1% or 0.5%)	-	-		-	-		-	-		-	-	
Discount rate (1% or 2% or 6%)	0.043	0.110		0.049	0.084		-0.081	0.065		0.387	0.134	***
Discount rate (10%, 20%, 30% or 40%)	-0.064	0.118		0.286	0.102	***	0.095	0.099		0.511	0.157	***
Discount rate (NA)	-0.143	0.145		-0.186	0.143		0.169	0.118		-0.072	0.197	
Risk attitude (0% for uncertain)	-	-		-	-		-	-		-	-	
Risk attitude (10%, 20% or 30% for uncertain)	-0.029	0.106		0.058	0.090		0.011	0.073		0.053	0.130	
Risk attitude (40%, 50% or 60% for uncertain)	-0.033	0.118		0.098	0.094		0.009	0.090		-0.027	0.133	
Risk attitude (70%, 80% or 90% for uncertain)	-0.090	0.133		-0.064	0.097		-0.053	0.097		0.133	0.199	
Risk attitude (NA)	0.149	0.150		0.273	0.190		-0.118	0.123		0.339	0.249	
Log likelihood	-158.863			-172.698			-396.433			-75.312		
Pseudo R2	0.098			0.211			0.0877			0.1957		
Number of Observations	260			353			654			151		

(Note) ***, **, and * stand for statistical significance of 1%, 5%, and 10% levels, respectively. The coefficients on each municipality are omitted from the table.

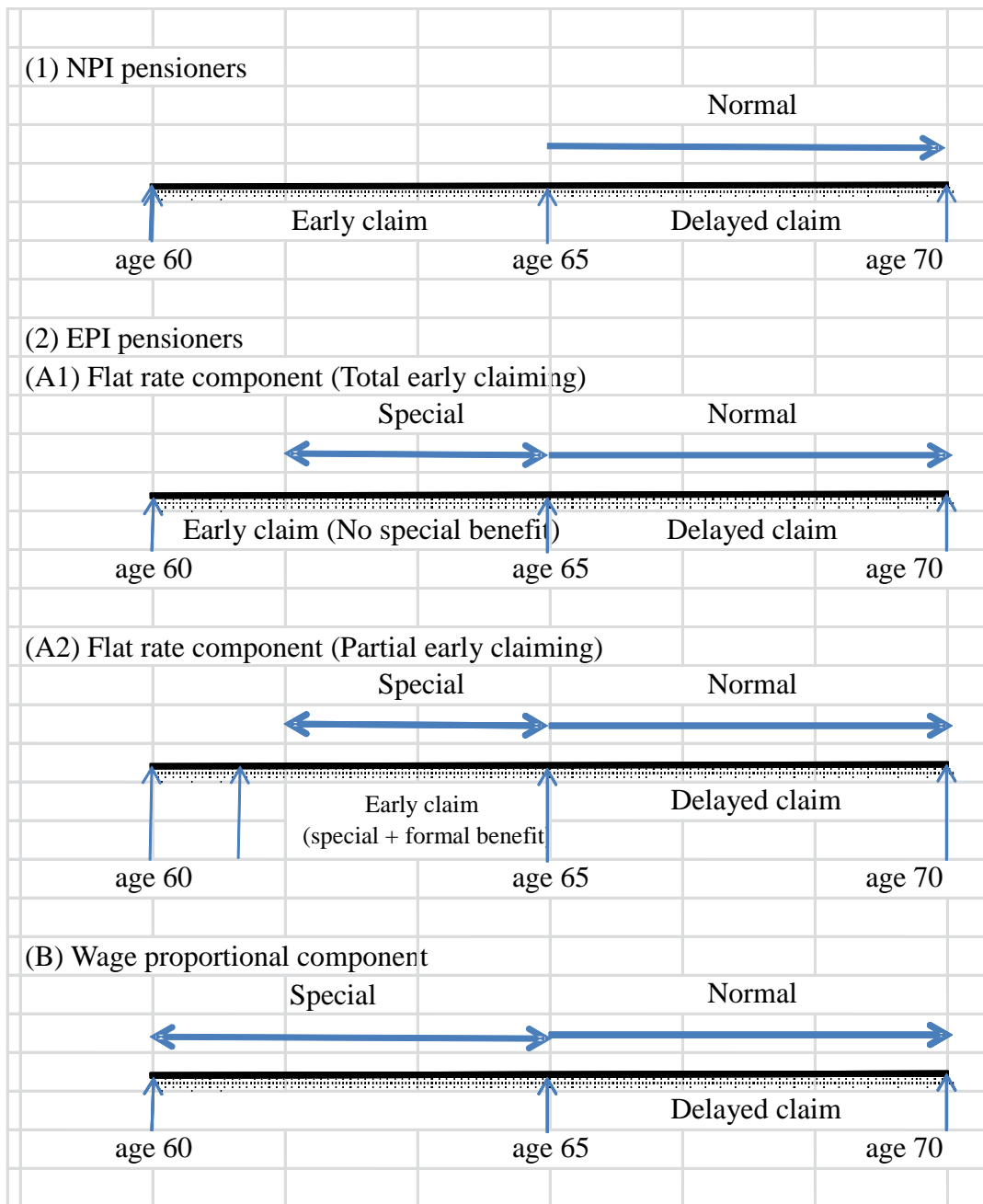**Figure 1 Early and delayed claiming of NPI and EPI pensioners**

(1) NPI pensioners

Normal

Early claim   Delayed claim

age 60   age 65   age 70

(2) EPI pensioners
(A1) Flat rate component (Total early claiming)

Special   Normal

Early claim (No special benefit)   Delayed claim

age 60   age 65   age 70

(A2) Flat rate component (Partial early claiming)

Special   Normal

Early claim
(special + formal benefit)   Delayed claim

age 60   age 65   age 70

(B) Wage proportional component

Special   Normal

Delayed claim

age 60   age 65   age 70

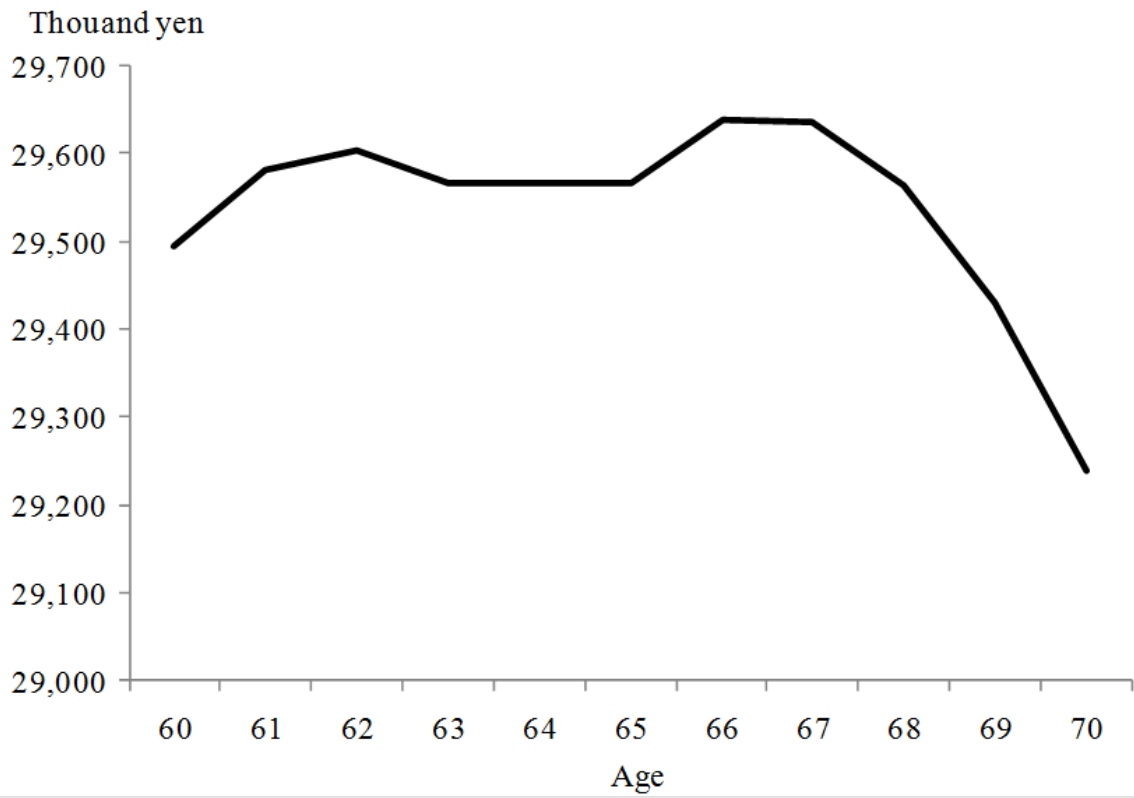**Figure 2. EPDV of benefits by age of benefit claiming: EPI beneficiary**

Figure 3. EPDV of benefits by age of benefit claiming: NPI beneficiary

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