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An Econometric Analysis of Non-enrollment in the National Pension by Foreign Residents in Japan

盧 宇晨

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Institute for Economic Studies, Keio University
2-15-45 Mita, Minato-ku, Tokyo 108-8345, Japan
ies-office@adst.keio.ac.jp
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キーワード: Foreign residents; Public pension; Social security; Probit regression analysis

【要旨】

In recent years, the rapid increase in the population of foreign residents in Japan has spurred more frequent discussions on social security issues concerning this group. Despite this, the non-enrollment rate in the National Pension among for- eign residents remains high, and the specific factors contributing to their non-enrollment remain unclear. This study conducted the first empirical analysis on the factors leading to the non-enrollment of foreign residents in Japan's Na- tional Pension using publicly available data. The results indicate that residence statuses restricted by work activities, liquidity constraints, years of education, and enrollment in private pensions in Japan or public pensions in other coun- tries significantly influence the likelihood of foreign residents enrolling in Japan's National Pension. Additionally, the study suggests that whether a foreign res-ident's country or region of nationality possesses a universal pension plan or an equivalent system is a potential factor affecting their enrollment in Japan's National Pension. This effect is particularly pronounced among foreign student populations.

盧 宇晨
慶應義塾大学経済学研究科
luyuchen@keio.jp

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An Econometric Analysis of Non-enrollment in the National Pension by Foreign Residents in Japan*

Yuchen Lu†
Keio University, Tokyo, Japan

Abstract

In recent years, the rapid increase in the population of foreign residents in Japan has spurred more frequent discussions on social security issues concerning this group. Despite this, the non-enrollment rate in the National Pension among foreign residents remains high, and the specific factors contributing to their non-enrollment remain unclear. This study conducted the first empirical analysis on the factors leading to the non-enrollment of foreign residents in Japan's National Pension using publicly available data. The results indicate that residence statuses restricted by work activities, liquidity constraints, years of education, and enrollment in private pensions in Japan or public pensions in other countries significantly influence the likelihood of foreign residents enrolling in Japan's National Pension. Additionally, the study suggests that whether a foreign resident's country or region of nationality possesses a universal pension plan or an equivalent system is a potential factor affecting their enrollment in Japan's National Pension. This effect is particularly pronounced among foreign student populations.

JEL Classification Codes: H55, F54, F21

Keywords: Foreign residents; Public pension; Social security; Probit regression analysis

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†PhD Student, Graduate School of Economics, Keio University, Tokyo. Email: luyuchen@keio.jp.

1 Introduction

Since the late 1950s, improvements in economic conditions and advancements in medical technology have continuously extended the average lifespan of Japanese people, making Japan one of the world's foremost nations in terms of longevity. Conversely, shifts in attitudes toward marriage and childbirth, including the rise of unmarried individuals and an increase in late marriages, have led to fluctuations in the total fertility rate, which initially dropped significantly in the 1950s before oscillating through periods of increase and decrease, ultimately exhibiting a gradual downward trend (Ministry of Health, Labour, and Welfare, Japan, 2018). With population aging and declining fertility rates advancing in parallel, the age composition of Japan's population is undergoing profound changes. According to population estimates from the fifth year of the Reiwa era, under median birth rate assumptions, the proportion of those aged 0–14 and 15–64, which stood at 11.9% and 59.5% respectively in 2020, is projected to decline to 9.2% and 52.1% by 2070. Meanwhile, the proportion of those aged 65 and over will rise from 28.6% in 2020 to 38.7% by 2070 (National Institute of Population and Social Security Research, 2023a). This continued demographic imbalance calls into question the sustainability of the social security system (Komamura, 2011).

Owing to the rapid pace of this demographic transition, labor force security has become an urgent issue in Japan. In response to an increasing need for labor, the Japanese government has enacted various policiessuch as establishing new residency qualifications and extending permitted periods of stayto facilitate the acceptance of foreign workers (Immigration Services Agency, Japan, 2019). As a result, the population of foreign residents has been steadily growing in recent years. Although it briefly declined in 2020 due to the global COVID-19 pandemic, by 2022 it had resumed an upward trend, reaching a record high of 3.41 million in December 2023 (Immigration Services Agency, Japan,

2024). Future projections suggest that the foreign resident population will likely continue to expand.

While this increase in foreign residents and their potential long-term settlement in Japan is generally expected, ensuring their social welfare has also emerged as an important issue. A key facet of this involves encouraging full enrollment in the public pension system so that foreign residents may maintain a minimum standard of living in old age. Yet, a significant number remain outside the system.

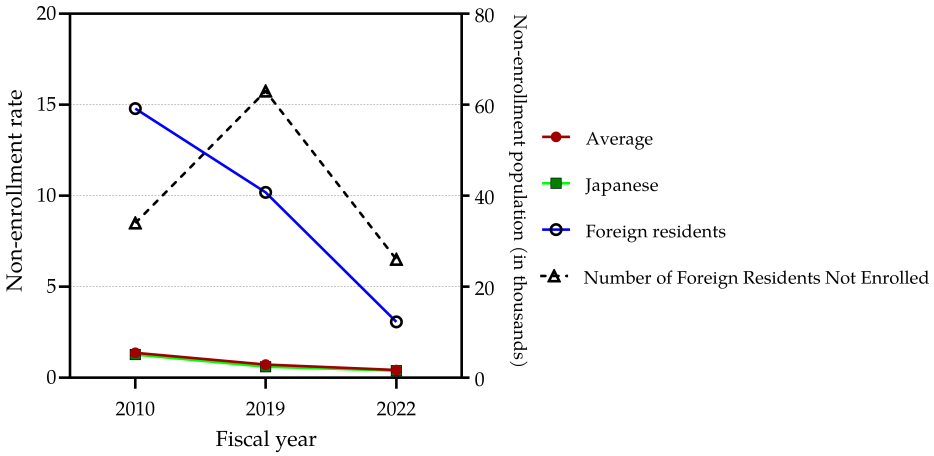
Japans public pension system is primarily composed of the National Pension (NP) and the Employees Pension (EP)[1]. After a series of administrative reforms and legal revisions, all foreign residents in Japan aged 20 to 59 are now obligated to enroll in the public pension system, just like Japanese nationals[2]. According to the "Overview of the Survey on Public Pension Enrollment (Fiscal Year 2010)", conducted in November 2010, the survey participants aged 20–59 comprised 64.707 million Japanese and 480,000 foreigners. Among these foreigners, 409,000 were enrolled in the public pension system, leaving a 14.79% non-enrollment ratesubstantially higher than the 1.27% non-enrollment rate among Japanese nationals (Ministry of Health, Labour, and Welfare, Japan, 2014). More recently, the "Survey on Public Pension Enrollment (Fiscal Year 2022)" was released in August 2024. This 2022 survey covered 106.755 million Japanese and 1.019 million for-

[1]In addition to the National Pension, which all citizens aged 20 to 59 must join, there is the Employees Pension for company employees and public servants. Previously, a separate Mutual Aid Pension existed for public servants and private school staff. However, in October 2015, following the implementation of the Employee Pension Integration Act, the Mutual Aid Pensions were consolidated into the Employees Pension (Japan Pension Service, 2023).

[2]Japans public pension system was established in 1959 with the enactment of the National Pension Law, which originally contained nationality requirements that excluded foreigners. These were abolished in October 1982, following Japans accession to the Convention and Protocol Relating to the Status of Refugees. In July 2012, the Alien Registration Law, which had governed foreign residents, was repealed. Since then, foreigners have been subject to the same Resident Registration Law as Japanese nationals, as a result of administrative streamlining (Harajiri, 2013). Consequently, all foreigners recorded in the Basic Resident Register became eligible for the National Pension, and even those not recorded but residing in Japan short-term are also covered (Ministry of Health, Labour, and Welfare, Japan, 2012).

eigners, revealing that 3.07% of foreigners aged 20–59 were not enrolled in the pension system. Although the foreign non-enrollment rate has dropped markedly from 14.79% to 3.07% over this twelve-year span, it still remains considerably higher than the 0.39% non-enrollment rate among Japanese (Figure 1).

Figure 1: Non-enrollment rates by nationality (Aged 20 to 59)



NOTE: Made by the author based on "Survey on Public Pension Enrollment (Fiscal Year 2010)", "Survey on Public Pension Enrollment (Fiscal Year 2019)", and "Survey on Public Pension Enrollment (Fiscal Year 2022)".

As the size of the foreign resident population in Japan surges, so too does public debate concerning their participation in social security. With the trend toward permanent settlement, ensuring that foreign residents can live out their later years in Japan with a stable standard of living has become increasingly urgent. Thus, strategies that promote foreign residents enrollment in the public pension system are gaining importance. Additionally, expanding coverage among foreign residents would greatly benefit Japans pay-as-you-go pension financing. Theoretical studies have often suggested that immigrants and their family members, soon after arrival, generate both economic value and positive fiscal impacts on social security systems, including pensions (Razin and Sadka,

1999; Lee and Miller, 2000; Sinn, 2001). Ishii and Korekawa (2015) simulated the fiscal impact of welcoming foreign workers under the Employees Pension Insurance and concluded that if all admitted workers joined this plan, the income replacement rate would improve. Moreover, if their family members relocated to Japan, and if foreign workers second generation remained in the country, the enhancement in the income replacement rate would be particularly pronounced. Even if all admitted foreign workers participated only as National Pension Category I insured persons, the resulting improvement would be smaller yet still help mitigate the decline in the basic pension level[3]. Moreover, in the "Financial Projection of Pension —FY 2024 Financial Verification—" released in July 2024, Japans authorities incorporated net migration[4] data into their demographic assumptions for the first time (Ministry of Health, Labour, and Welfare, Japan, 2024), underscoring the rising importance of foreign residents in bolstering Japans public pension finances.

Given that foreign residents in Japan continue to show a comparatively high rate of non-enrollment in the public pension system, and in light of the essentially voluntary nature of NP participation, the precise factors driving foreign residents choice not to enroll remain unclear. This study utilizes publicly available microdata to focus on non-enrollment behavior in the NP among foreign residents in Japan and conducts an empirical analysis. The structure is as follows: The next section reviews existing studies on NP non-enrollment; the third section describes the data, methodology, and hypotheses; the fourth section presents the estimation results; and the fifth section discusses the findings

[3]Under Japans public pension system, Category I insured persons include all residents aged 20–59 who are not in Category II or Category III. Category II refers to those enrolled in the EP (except individuals over 70 receiving a pension), while Category III covers dependent spouses of Category II insured persons. For further details, see (Japan Pension Service, 2024d)

[4]Net migration figures represent the difference between entries and exits in a given period (typically one year) for both Japanese and foreigners. Although this statistic nominally includes Japanese nationals, Japans net migration of Japanese was negative for most years from 1951 to 2021. Thus, the net migration figures assumed in the FY 2024 financial verification —a median of 164,000, a high of 250,000, and a low of 69,000— largely reflect inflows of foreign populations. For details on the net migration trend for Japanese, see (National Institute of Population and Social Security Research, 2023b).

and offers policy recommendations.

2 Literature Review

Although research on foreign residents in Japan not participate the NP system is relatively limited, empirical studies on Japanese nationals not participating in the NP are more common. The main reasons can generally be categorized into three types: diversification of employment types, liquidity constraints, and expected age of death.

Firstly, diversification of employment types refer to the fact that, although the number of irregular employees such as part-timers in Japan is increasing annually, most of them are only eligible for the NP as they do not meet the criteria to join the EP. Due to the unstable income of this flexible employment group, and the responsibility of paying the NP premium falling on the insured themselves, it is easy for them to fall behind on their NP premium payments or even not join the NP at all. The phenomenon that this factor significantly impacts the NP enrollment rate has been confirmed by numerous empirical studies (Moribayashi and Kubo, 2018).

Regarding the impact of liquidity constraints, numerous empirical studies targeting Japanese nationals have shown that liquidity constraints significantly negatively affect enrollment in the NP. Suzuki and Zhou (2001) utilizing individual data from the "Household and Savings Survey (1996)" provided by the Institute for Information and Communications Policy (formerly the Postal Service Research Institute), confirmed the significant negative impact of liquidity constraints on NP enrollment. In their study, liquidity constraints were subdivided into labor income and financial assets. To eliminate potential correlation issues between employment status and labor income, researchers excluded the sample's own labor income and financial assets from the analysis, considering only the labor income and financial assets of other family members.

Besides, some empirical studies in Japan show that people with shorter expected lifespans are more inclined to default on their national pension insurance payments, a phenomenon known as the expected age of death (Komamura and Yamada, 2007). This phenomenon occurs because individuals weigh the total amount of pension they expect to receive against the total pension insurance premiums they need to pay. Those with shorter expected lifespans often anticipate receiving a lower total pension amount in the future, and therefore may choose to stop making ongoing pension insurance payments. Although it is not possible to directly observe or obtain the expected age of death, related studies analyze this by asking respondents whether they often fall ill or self-rated health as poor, using these variables as proxies for the expected age of death. The research results show that those who are often ill or rate their health as poor are more likely not to join the pension insurance. These findings indirectly demonstrate that the expected age of death factor may significantly influence the non-enrollment in the NP (Suzuki and Zhou, 2001).

In addition to the three previously mentioned reasons, generational inequity is also considered one of the factors leading to delinquency or non-enrollment in national pension insurance. The study by Ogura and Chiba (1991) reveals that an increase in social insurance premiums intensifies the economic burden on the working-age generation, potentially leading to a higher rate of non-enrollment in social insurance among this group. Similarly, Suzuki and Zhou (2001) used age as a proxy variable for intergenerational inequity and found a significant negative correlation between age and non-enrollment in national pension insurance, indicating that non-enrollment is more likely among the younger generation. However, Suzuki and Zhou (2005) did not find any cohort effects in their study using pooled cross-sectional data constructed from multiple years of the Household and Savings Survey, which contradicts the conclusions of prior research that significant age coefficients indicate a significant impact of intergenerational inequity on

non-enrollment in the NP. Despite this, in their study, Suzuki and Zhou (2005) still observed a significant impact of age on non-enrollment in the NP.

Additionally, factors such as the enrollment status in private annuity insurance in Japan[5] and parents' awareness of pension payments[6] are also considered potential factors affecting the enrollment status in the NP (Oishi, 2007; Sasaki, 2008).

Regarding foreign residents in Japan, although there are currently no empirical studies on the factors influencing their decisions not to enroll in the national pension insurance, some reports indicate significant differences in non-enrollment rates among various residence statuses. Report on the "Survey of Foreign Citizens Regarding Life and Work, 2018" notes that the non-enrollment rate for public pension insurance is about 10% for Special Permanent Resident or Permanent Resident, while it reaches up to 20% among groups with residence status like Spouse, etc. of Japanese national (Research Group on Social Stratification in a Multicultural Society, 2024). This suggests that residence status may be a potential factor affecting the enrollment in the NP. In the "Results of an Independent Survey by SRC[7]," some foreign respondents also indicated that due to "Lack of understanding of the Japanese pension system" and "Financial difficulties," they did not enroll in Japan's public pension plan (Survey Research Center Co., Ltd., 2022). Additionally, Suguimoto et al. (2012) found in their survey of latin American foreign residents in Nagahama City, Shiga Prefecture, Japan, that factors such as "Dont understand the Japanese insurance system," "To expensive to enroll," "I will be leaving Japan soon," and "I have to save/send money" were cited by some respondents as reasons for not enrolling

[5]Oishi (2007) found that individuals who enroll in private pension insurance in Japan have a relatively lower probability of not enrolling in the NP.

[6]Sasaki (2008) conducted an original survey analysis in July 2006 on social science students at four universities in the Chubu region and Shikoku region and found that parents' awareness of pension contributions significantly influenced their children's participation in the NP. This finding indirectly suggests that having awareness of joining the public pension could be another potential factor affecting an individuals decision to enroll in the public pension system.

[7]SRC stands for Survey Research Center Co., Ltd.

in the public health insurance program.

3 Data, Methodology and Hypothesis

3.1 Data

This study received individual-level data from the "Survey of Foreign Citizens Regarding Life and Work, 2018" (SFCRLW 2018), donated by the Research Group on Social Stratification in a Multicultural Society at Tohoku University, which was published by the Social Science Japan Data Archive (SSJDA) in February 2024[8]. The survey targeted foreign nationals aged 20 to 69 residing in municipalities covering 90% of the foreign national population, and was conducted from January 15 to February 16, 2018. The survey was administered in four languages: Japanese, English, Chinese, and Portuguese, using a self-administered questionnaire sent by mail. Sampling was conducted using a two-stage stratified sampling method. Municipalities were selected based on a probability proportionate to the size of the foreign national population, followed by further sampling of town blocks based on the format of the Basic Resident Register, and then individuals were selected (SSJDA, 2024). Questionnaires were sent to 5,000 people in 60 randomly selected municipalities, and responses were ultimately obtained from 1,123 participants. The response rate, excluding those with unknown addresses, was 23.8% (Research Group on Social Stratification in a Multicultural Society, 2024). The survey is divided into 12 sections—covering Basic Personal Information, Current Employment, First Job in Japan, Last Job Before Coming to Japan, Educational Background, Family at Age 15, Spouse, Family Members, Lifestyle, Opinions on Society, About Stay in Japan, and Economic

[8]The survey was funded by the Ministry of Education, Culture, Sports, Science and Technology (MEXT) Grant-in-Aid for Scientific Research (Project/Area Number: 16H05954).

Situation—and employs a conditional branching design, with respondents required to answer a total of 57 questions when all conditions are met. SFCRLW 2018 is currently the only publicly available, probability-sampling-based comprehensive survey targeting foreign residents in Japan. This is also the main reason we chose this survey.

3.2 Methodology

3.2.1 Dependent Variable

Given that the focus of this study is on enrollment in NP insurance, particular attention was paid to the ninth question in the questionnaire of the SFCRLW 2018. This item queries the participants about their enrollment in annuity insurance (i.e., pension insurance) and is presented in a multiple-choice format. Among these, Option 1 and Option 2 correspond to the NP and EP, respectively.

Q9. Do you have the following annuity insurance? Circle everything that applies.

1. *National Pension*
2. *Employees' pension, mutual aid pension*
3. *Private annuity insurance in Japan*
4. *Public annuity insurance of a country other than Japan*
5. *Private annuity insurance of a country other than Japan*
6. *Other annuity insurance*
7. *None*
8. *I don't know*

Table 1 presents the response patterns for Q9. There are 29 response patterns in total. Among them, 24 respondents did not answer this question. The number of respondents who chose Option 1 or Option 2 (or both) was 734, accounting for 66.85% of all 1,098

respondents who answered the question. The number of respondents who did not select Option 1 or Option 2 was 388; after excluding 102 respondents who chose "I don't know," the number considered not enrolled in Japan's public pension system was 286, accounting for 26.05% of all respondents who answered the question.

Table 1: Response Patterns for Q9

Option	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
National Pension		✓								
Employees' pension, mutual aid pension			✓							
Private annuity insurance in Japan				✓						
Public annuity insurance of a country other than Japan					✓					
Private annuity insurance of a country other than Japan						✓				
Other annuity insurance							✓			
None								✓		
I don't know									✓	
Total	24†	259	329	15	23	15	14	212	102†	

Option	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
National Pension	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Employees' pension, mutual aid pension	✓	✓	✓	✓	✓					
Private annuity insurance in Japan		✓			✓		✓	✓		
Public annuity insurance of a country other than Japan			✓		✓	✓		✓		✓
Private annuity insurance of a country other than Japan				✓		✓		✓	✓	
Other annuity insurance										
None										
I don't know										
Total	62	5	7	1	1	2	7	1	4	9

Option	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)
National Pension	✓	✓								
Employees' pension, mutual aid pension			✓	✓	✓	✓	✓			
Private annuity insurance in Japan			✓	✓						✓
Public annuity insurance of a country other than Japan					✓		✓	✓		
Private annuity insurance of a country other than Japan			✓		✓	✓		✓	✓	✓
Other annuity insurance		✓							✓	✓
None										
I don't know	✓									
Total	1†	1	1	12	1	2	5	5	1	1

Our dependent variable is in binary form, specifically defined as: participation in the NP is coded as 1, and all other cases are coded as 0. However, the 20th response pattern, where "National Pension" and "I dont know" are selected simultaneously, the sample will be excluded from the analysis due to the contradictory nature of the answers.

$$Y = \begin{cases} 1 & \text{if the individual is participating in the NP,} \\ 0 & \text{otherwise.} \end{cases} \tag{1}$$

3.2.2 Data Preprocessing

To obtain more precise estimation results, we will select the analysis samples following the process outlined in steps 1 to 5.

Step 1:

Regarding the samples that did not respond in Q9 (24 individuals) and those who selected "I don't know" (102 individuals), since these data cannot be used for analysis, we first exclude them. Additionally, for the sample that selected both "National Pension" and "I don't know" (1 individual), due to the contradictory responses, we also preliminarily exclude this sample.

Step 2:

In this step, we will exclude all samples that are enrolled in the EP. In Japan, the law mandates that all corporations of any size and sole proprietors with at least five permanent employees in specified industries must contribute to EP for their management and permanent staff[9]. Additionally, for non-permanent employees who meet the criteria for EP enrollment, companies are also obligated to pay the insurance premiums[10]. Unlike

[9]For more details, please see Ministry of Health, Labour, and Welfare, Japan (2019)

[10]For instance, for part-time workers, the company must have more than 501 insured individuals, and specific requirements must be met regarding weekly working hours or days, duration of employment, and labor income. Dispatched workers, contract workers, and short-term contract

the NP, the premiums for the EP are paid by the employers, not the insured individuals themselves. Therefore, employees who meet the conditions for enrollment in the EP, in principle, do not experience issues such as non-payment of pension premiums, similar to adverse selection scenarios seen with the NP. Consequently, using samples from Q9 who selected "Employees' pension, mutual aid pension," indicating they are already enrolled in the EP, holds little significance for analysis.

Step 3:

In this step, we excluded samples from countries that have signed social security agreements with Japan and who are already enrolled in their home countrys public pension system. This is because, according to the provisions of the social security agreements, to prevent double payment of social insurance premiums, workers who are temporarily sent to Japan from countries with which agreements exist can demonstrate their enrollment in a public pension system of a treaty country and are therefore not subject to public pension insurance in Japan[11]. Table 2 presents the list of countries that had signed and implemented social security agreements with Japan as of April 2024. It should be noted that, considering the survey was conducted between January and February 2018, the Philippines, Slovenia, China PR, Finland, Sweden, and Italy had not yet signed social security agreements with Japan at that time.

workers also need to meet several similar conditions to be mandatorily covered by EP. The requirement that a company must have more than 501 insured individuals applied until 2022. However, in October 2022, the Japanese government revised this company size requirement, lowering it to a minimum of 101 insured individuals. By October 2024, this requirement will be further relaxed to a minimum of 51 insured individuals. For more details, please see Japan Pension Service (2024b).

[11]Japan initiated its social security agreements with other countries starting with the agreement that came into effect with Germany in February 2000 (Matsumoto, 2016). By April 2024, the number of countries with which Japan has signed social security agreements expanded to 23 (Japan Pension Service, 2024e).

Table 2: Countries with Implemented Social Security Agreements

Country	Effective Date	Country	Effective Date
Germany†	February 2000	Brazil†	March 2012
United Kingdom†	February 2001	Switzerland†	March 2012
South Korea†	April 2005	Hungary†	January 2014
United States†	October 2005	India†	October 2016
Belgium†	January 2007	Luxembourg†	August 2017
France†	June 2007	Philippines	August 2018
Canada†	March 2008	Slovenia	July 2019
Australia†	January 2009	China PR	September 2019
Netherlands†	March 2009	Finland	February 2022
Czech Republic†	June 2009	Sweden	June 2022
Spain†	December 2010	Italy	April 2024
Ireland†	December 2010		

NOTE: Made by the author based on Japan Pension Service (2024e)

Table 3 displays the nationality distribution of samples who selected "Public annuity insurance of a country other than Japan" in Q9, totaling 54 samples. Among them, countries like Brazil, India, and the U.S. had already signed and implemented social security agreements with Japan before the survey was conducted in 2018. Considering that the major countries in North America, Europe, and Oceania had signed and implemented social security agreements with Japan before 2018, we also consider samples marked as "Other North American, European, and Oceanian countries" (ONAEO) as potential subjects of these agreements. Regarding the samples labeled as "text"South Korea/North Korea, we will assume their nationality to be South Korean. This decision is based on the "Statistics on Foreign Residents (End of December 2017)," which found that nearly all individuals of North Korean nationality in Japan are special permanent residents[12]. However, both samples' residence status is "Engineer/Specialist in Humanities/International Services". Therefore, the likelihood that these two samples marked as "South

[12]The reason for using the "Statistics on Foreign Residents (End of December 2017)" is that its survey date is close to January 2018. According to the statistics from "Statistics on Foreign Residents (End of December 2017)," as of December 2017, there were 30,859 North Korean nationals in Japan, of whom 30,243 held the status of special permanent residents, accounting for 98.00%.

Korea/North Korea" are actually of North Korean nationality is extremely low.

Table 3: Nationality Distribution

Nationality	N	Percent
Missing data[1]	1	2.50
Other Asian countries	2	5.00
ONAEO†	3	7.50
The United States†	4	10.00
India†	1	2.50
The Philippines	6	15.00
Brazil†	4	10.00
Vietnam	1	2.50
Peru	1	2.50
China PR	14	35.00
Taiwan	1	2.50
South Korea/North Korea†	2	5.00
Total	40	100.00

[1] Missing nationality response.
This table was created based on the samples obtained after data cleaning in Steps 1 and 2.

Table 4 shows the distribution of residence statuses among samples from the regions mentioned above. We attempted to find samples with the "Intra-company Transferee" residence status, typically applicable to employees who first work in a subsidiary outside Japan before being transferred to a subsidiary in Japan. Such samples are very likely to meet the conditions of social security agreements. However, we have not yet found such samples.

Table 4: Population Distribution of Residence Status

	ONAEO	U.S.	India	Brazil	South Korea/North Korea
Long-term Resident	0	0	0	1	0
ESI[1]	0	2	1	0	2
Spouse, etc. of Japanese national	1	0	0	0	0
Permanent Resident	2	1	0	3	0
Others	0	1	0	0	0

[1] ESI stands for Engineer, Specialist in Humanities/International Services. Residence statuses not listed in the table indicate that the sample size for all five countries or regions is zero.

Step 4:

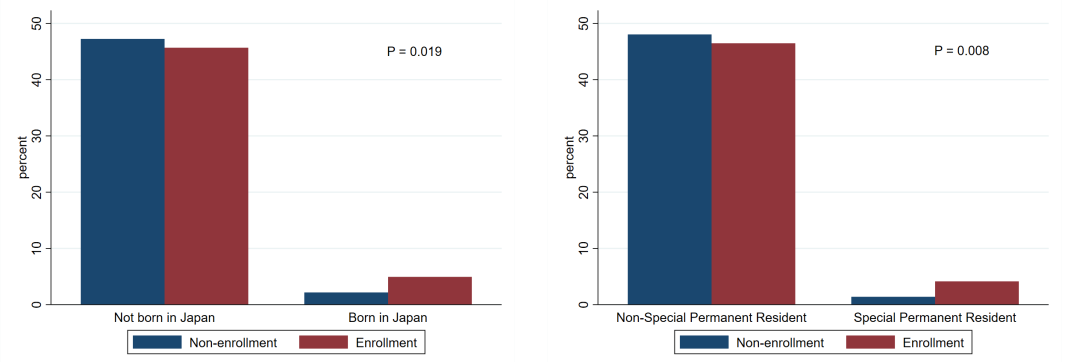
Considering that the mandatory enrollment age for Japans NP is from 20 to 59 years, while participation for those aged 60 to 70 is not compulsory, we will therefore drop samples aged 60 and above.

Step 5:

For the remaining samples, we will exclude those who selected "Japan" in Q4 and "Special Permanent Resident" in Q50[13]. The reason is that these two groups have a deeper understanding of Japan's pension system and other related systems, and their behavior patterns are closer to those of Japanese nationals rather than typical foreign residents in Japan.

We also conducted χ^2 tests to compare groups and confirmed significant differences in NP enrollment between foreign nationals born in Japan and special permanent residents, and other types of foreign residents in Japan. This result aligns with our expectations (Figure 2).

Figure 2: Between-group Comparison Regarding Enrollment in the NP (Aged 20 to 59)



(a) Birth region **(b)** Residence status

[13]Q4 and Q50 refer to Question 4 and Question 50 of the SFCRLW 2018.

3.2.3 Explanatory Variables

The independent variables inputted in this study are primarily based on insights from prior research and are tailored according to the content of the survey questionnaire used in this instance. First, we select the total financial assets of household members as variables representing liquidity constraints, and the employment status representing factors of employment form diversity for subsequent analysis[14]. It should be noted that although the survey also inquired about respondents' personal annual income (or expected annual income), considering that the annual income of foreign residents mainly comes from labor income, and prior research indicates that the employment form can significantly affect labor income, this study has decided not to include respondents' personal annual income in the analysis[15]. Additionally, considering the phenomenon of foreign residents in Japan sending remittances to overseas family members, and how this behavior may exacerbate their liquidity constraints, we have decided to include ongoing overseas remittance activity as a variable representing liquidity constraints in our analysis.

Regarding the factor of expected age of death mentioned in prior research, we use self-assessed health status as its proxy variable. Additionally, inspired by prior research, we have decided to include the expected duration of stay in Japan in our analysis. Compared to the expected age of death, foreign residents in Japan may place more emphasis on the more pressing decision of whether to choose to live in Japan long-term, as a basis for deciding whether to continue paying NP premiums. Although foreign residents can apply to the Japan Pension Service for a partial refund of the NP premiums they have paid before and after deciding to return to their home country, the refund is only partial,

[14] According to the survey questionnaire, the financial assets referred to include deposits and stocks. Besides, the household members referred to here also include those who maintain livelihoods together with the respondent overseas.

[15] According to the survey questionnaire, the referred income includes not only labor earnings but also the total of other types of income such as stock profits.

and considering that the value of future cash flows is usually lower than the present value, those who have not decided to reside in Japan long-term may lack the motivation to continue paying NP premiums[16]. We refer to this variable as the expected duration of stay factor.

Considering the lack of understanding of Japan's public insurance system reflected in prior research, although the factors influencing foreign residents' understanding of the local system are complex, we considered two possible influencing factors: Japanese language proficiency and educational attainment. Kramsch (1993) elaborated in detail on the importance of language learning for understanding local culture or systems. Additionally, Diehl and Blohm (2001) notes that immigrants with higher educational levels are more likely to understand and engage in the host country's political system. The survey used in this study assesses Japanese language proficiency across three dimensions: conversational ability, reading ability, and writing ability. Each dimension is rated on a five-level scale: "I can do it almost perfectly," "I can do it relatively well," "I can do it to some extent," "I cannot do it well," and "I cannot do it at all," all of which are ordinal variables. We will analyze the dimensions of Japanese conversational and reading abilities. Regarding educational attainment, the survey inquired about the respondents' years of education, which we will use as a variable to measure their educational attainment.

Regarding the age effects observed in prior research, this study also controls for age. About the substitution or complementary relationship between private pension and public pension, we will use the Q9 to create three dummy variables that may influence enrollment in Japan's NP: "Enrollment in Japan's private pension," "Enrollment in public pension of a country other than Japan," and "Enrollment in private pension of a country

[16]According to relevant regulations, if the last payment of NP premiums was made in April 2021 or later, foreign insured individuals residing in Japan can retroactively apply for a refund of the NP premiums paid within the last five years. Conversely, if the last payment was made before April 2021, these insured individuals can only apply for a refund of the premiums paid for up to the last three years. For more details, please refer to Japan Pension Service (2024c)

other than Japan."

Considering the impact of parental awareness of national pension contributions mentioned in prior research, considering that our study focuses on foreign residents in Japan, we further considered whether the nationality countries of these residents implement a universal pension system similar to Japan's. This factor could significantly influence their enrollment status in Japan's NP. Therefore, we have also included "The country or region of nationality possesses a universal pension scheme or an equivalent system" as a variable in our analysis to explore its effect on the non-enrollment decisions of foreign residents in Japan's NP. The nationalities of the respondents in the SFCRLW 2018 included the following countries or regions: China PR, South Korea/North Korea, Taiwan, the Philippines, Thailand, India, Vietnam, Brazil, Peru, the United States, other Asian countries, other Central and South American and African countries, other North American, European, and Oceanian countries, and other regions. We primarily rely on OECD (2019) to assess whether a country or region has implemented a universal pension plan or an equivalent system. This evaluation is based on the comprehensiveness of the public pension system and the enrollment rates of the respective populations. Most European countries, along with Canada, Australia, and New Zealand, have public pension systems that cover nearly all residents. In China, the basic pension insurance for urban and rural residents extends coverage to a wide range of unemployed individuals in both rural and urban areas, achieving fundamental universal pension coverage. Although South Korea's national pension system was established later, it had effectively covered the majority of the nation's residents. Taiwan's public pension insurance system is similar to Japan's, featuring the proportion of people enrolled in the public pension system relative to the 15-64 age population has consistently remained above 80% (Kojima, 2024). Therefore, we categorize China PR, South Korea/North Korea, Taiwan, and other North American, European, and Oceanian countries as having a universal pension scheme or an equivalent

system. Conversely, although the United States has a relatively comprehensive pension system, its public pension system has lower coverage rates among low-income groups, students, and the unemployed. In the case of the Philippines, Thailand, India, Vietnam, Brazil, Peru, other Asian countries, other Central and South American and African countries, and other regions, there are issues with insufficient systems and low enrollment rates. Therefore, we categorize these countries and regions as lacking a universal pension scheme or an equivalent system (Table 5).

Table 5: Classification of countries or regions

The country or region of nationality possesses a universal pension scheme or an equivalent system	Countries or regions
Yes	China PR, South Korea/North Korea, Taiwan, and other North American, European, and Oceanian countries.
No	the Philippines, Thailand, India, Vietnam, Brazil, Peru, the United States, other Asian countries, other Central and South American and African countries, and other regions.

Furthermore, regarding the impact of residence status on NP enrollment status, we conducted corresponding χ^2 tests (see Table 6). Compared to prior studies, we did not find a high proportion of individuals with the "Spouse, etc. of Japanese national" residence status who were not enrolled in the NP in our sample. Conversely, individuals holding "Dependent" and "Student" residence statuses had a noticeably higher proportion of non-enrollment in the NP, as these types of residence statuses typically do not permit employment in Japan. Based on this, we hypothesize that there is a potential correlation between residence statuses that do not permit employment and non-enrollment in the NP. To further explore the impact of work activity restrictions on NP enrollment, we established a dummy variable "Residence statuses that does not permit work activities,"

to analyze its potential effects on pension enrollment.

Table 6: Relationship between residence statuses and NP enrollment status

	Total		Non-enrollment		Enrollment	
Residence status	N	Percent	N	Percent	N	Percent
Spouse, etc. of Japanese national	51	10.08	20	7.69	31	12.60
Dependent	29	5.73	21	8.08	8	3.25
Student	128	25.30	91	35.00	37	15.04

NOTE: P<0.001. This table only shows partial results of the χ^2 tests for residence status and NP enrollment status.

Table 7 lists the explanatory variables used for analysis. Among them, age and years of education are numerical variables, while the rest are categorical variables.

Table 7: List of explanatory variables

Variable	**Scales of Measurement**	**Name**
Employment status	Nominal scale	EP
Total financial assets of household members	Ordinal scale	FN
Presence of overseas remittance behavior[A]	Nominal scale	ORB
Self-assessed health status is worse[A]	Nominal scale	HT
Plans to permanently reside in Japan[A]	Nominal scale	PRJ
Duration already stayed in Japan	Nominal scale	DSJ
Years of education[B]	*Ratio scale*	YE
Japanese conversational ability is worse[A]	Nominal scale	JCA
Japanese reading abilit is worse[A]	Nominal scale	JRA
Age[B]	*Ratio scale*	AG
Enrollment in Japan's private pension[A]	Nominal scale	EJPV
Enrollment in public pension of a country other than Japan[A]	Nominal scale	EOPB
The country or region of nationality possesses a universal pension scheme or an equivalent system [A]	Nominal scale	NUP
Residence statuses that are under work activity restrictions[1A]	Nominal scale	RS

[1] Including "Dependent" and "Student" residence statuses.

[A] Binary dummy variable. Affirmative responses are coded as 1.

[B] Numerical variable.

3.2.4 Model

We conducted the analysis using a probit model. The estimated regression model is as follows:

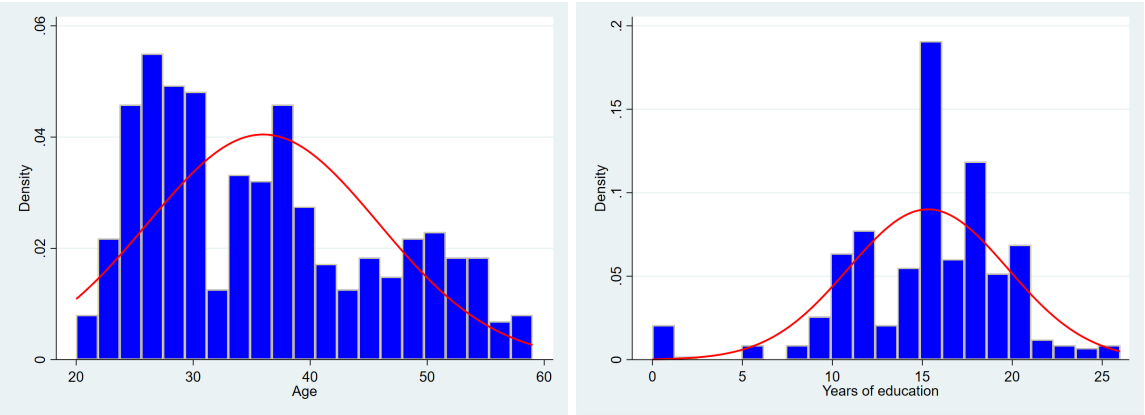
$$
\begin{aligned}
y^* &= \boldsymbol{X}\boldsymbol{\gamma} + \epsilon_i \\
&= \gamma_0 + \begin{cases} \underbrace{\sum_{j=1}^{J} \gamma_{(EP)j}\, EP_{ji}}_{\text{Diversification of employment types}} & \text{(Model 1)} \\ \underbrace{\gamma_{(RS)}\, RS_i}_{\text{Work activity restrictions}} & \text{(Model 2)} \end{cases} \\
&\quad + \underbrace{\sum_{l=1}^{L} \gamma_{(FN)l}\, FN_{li} + \gamma_{(ORB)}\, ORB_i}_{\text{Liquidity constraints}} + \underbrace{\gamma_{(HT)}\, HT_i + \gamma_{(PRJ)}\, PRJ_i}_{\text{Expected age of death and duration}} \\
&\quad + \underbrace{\sum_{n=1}^{N} \gamma_{(DSJ)n}\, DSJ_{ni} + \gamma_{(YE)}\, YE_i + \gamma_{(JCA)}\, JCA_i + \gamma_{(JRA)}\, JRA_i}_{\text{Understanding of Japan's healthcare insurance system}} \\
&\quad + \underbrace{\gamma_{(AG)}\, AG_i}_{\text{Age effect}} + \underbrace{\gamma_{(EJPV)}\, EJPV_i + \gamma_{(EOPB)}\, EOPB_i}_{\text{Relationship between the NP and other pensions}} \\
&\quad + \underbrace{\gamma_{(NUP)}\, NUP_i}_{\text{Awareness of public pension enrollment}} + \epsilon_i \\
&\textit{where} \quad \epsilon_i \sim N(0,1)
\end{aligned} \tag{2}
$$

$$
y = \begin{cases} 1 & \text{if } y^* > 0 \\ 0 & \text{otherwise} \end{cases} \tag{3}
$$

Here, $\boldsymbol{X}$ represents the row vector comprising p observed variables for a single individual, while γ is a $p \times 1$ column vector of coefficients. ϵ_i is the error term, following a normal distribution with mean 0 and standard deviation 1. y^* is a continuous latent variable determined by the input variables $\boldsymbol{X}$ and the coefficients γ, which are estimated using the maximum likelihood estimation (MLE). The dependent variable y is set to 1 when $y^* > 0$ and to 0 when $y^* \leq 0$. To evaluate the consistency between the predicted y and the actual observed Y, the Area under the Receiver Operating Characteristic (ROC) curve (AUC) will be utilized to assess the model's discriminative accuracy.

Figure 3 displays the histogram of age and years of education in the analysis sample.

Figure 3: Histogram of age and years of education



(a) Age **(b)** Years of education

We also employed univariate probit regressions to examine the association between NP enrollment and the two numerical variables. Regarding the univariate Probit regression results, in the analysis focusing on Age, the estimated coefficient was 0.010 (SE = 0.006, p = 0.101), indicating that it was not statistically significant at conventional levels. The intercept was -0.369 (SE = 0.220, p = 0.094), and the model's log-likelihood was -324.366. In a separate analysis examining Years of Education, the estimated coefficient

was 0.011 (SE = 0.013, p = 0.384), which also was not statistically significant. The intercept was -0.196 (SE = 0.209, p = 0.348), and the corresponding log-likelihood was -325.331. According to the results, both age and years of education have a positive effect on NP enrollment, but the extent of this influence is very weak and not statistically significant.

Table 8 presents the descriptive statistics of categorical variables in the analysis sample, excluding age and years of education.Employment status, plans to permanently reside in Japan, duration already stayed in Japan, Japanese conversational abilit is worse, Japanese reading ability is worse, enrollment in public pension of a country other than Japan, and residence statuses that are under work activity restrictions are significantly correlated with NP enrollment at the 5% significance level in χ^2 tests. The total financial assets of household members are significantly correlated with NP enrollment at the 10% significance level in χ^2 tests. The variables concerning enrollment in Japans private pension and the country or region of nationality possesses a universal pension scheme or an equivalent system are correlated with NP enrollment, with p-values around 10% in χ^2 tests.

Table 8: Descriptive statistics

Variable	Total N	Total Percent	Non-enrollment N	Non-enrollment Percent	Enrollment N	Enrollment Percent	P-value
Employment status							<0.001
Regular employee/Business owner	97	20.77	35	14.71	62	27.07	
Dispatched worker/Contract employee/Advisory staff	76	16.27	32	13.45	44	19.21	
Part-time/Temporary job	64	13.70	31	13.03	33	14.41	
Self-employed/Freelancer	14	3.00	5	2.10	9	3.93	
Student	134	28.69	96	40.34	38	16.59	
Helping with family business/Home-based job/Employment status unknown	6	1.28	2	0.94	4	1.75	
Unemployed/Job-seeking	76	16.27	37	15.55	39	17.03	
Total financial assets of household members							0.043
Over 3 million yen	114	26.82	47	21.36	67	32.68	
Less than 3 million yen	99	23.29	51	23.18	48	23.41	
None	104	24.47	58	26.36	46	22.44	
Don't know	108	25.41	64	29.09	44	21.46	
Presence of overseas remittance behavior							0.317
Yes	142	31.28	67	29.13	75	33.48	
No	312	68.72	163	70.87	149	66.52	
Self-assessed health status is worse							0.832
Yes	44	9.46	23	9.75	21	9.17	
No	421	90.54	213	90.25	208	90.83	
Plans to permanently reside in Japan							0.011
Yes	166	35.62	71	30.08	95	41.30	
No	300	64.38	165	69.92	135	58.70	
Duration already stayed in Japan							<0.001
Less than 1 year	41	8.87	30	12.66	11	4.89	
1 to 3 years	129	27.92	84	35.44	45	20.00	
4 to 9 years	110	23.81	48	20.25	62	27.56	
Over 10 years	182	39.39	75	31.65	107	47.56	
Japanese conversational ability is worse							0.001
Yes	101	21.54	66	65.35	173	47.01	
No	368	78.46	35	34.65	195	52.99	
Japanese reading ability is worse							0.045
Yes	144	30.97	84	58.33	155	48.29	
No	321	69.03	60	41.67	166	51.71	
Enrollment in Japan's private pension							0.118
Yes	19	4.04	13	5.44	6	2.60	
No	451	95.96	226	94.56	225	97.40	
Enrollment in public pension of a country other than Japan							0.009
Yes	38	8.09	27	11.30	11	4.76	
No	432	91.91	212	88.70	220	95.24	
The country or region of nationality possesses a universal pension scheme or an equivalent system							0.102
Yes	267	56.81	127	53.14	140	60.61	
No	203	43.19	112	46.86	91	39.39	
Residence statuses that are under work activity restrictions							<0.001
Yes	157	34.20	112	48.07	45	19.91	
No	302	65.80	121	51.93	181	80.09	

3.3 Hypothesis

Based on prior research and the discussion above, we propose the following hypotheses regarding the impact of various variables on NP enrollment:

No.	Hypothesis
1	*Compared to formal employment, informal employment and unemployment (including students) are more likely to lead to non-enrollment in the NP due to lower and unstable income.*
2	*The lower the total financial assets of household members, the more likely it is to result in non-enrollment in the NP.*
3	*Overseas remittance behavior can lead to liquidity constraints, and the presence of such behavior makes non-enrollment in the NP more likely.*
4	*The worse the self-assessed health status, the more likely it is to lead to non-enrollment in the NP.*
5	*Not planning to permanently reside in Japan makes it more likely to result in non-enrollment in the NP.*
6	*The shorter the duration already stayed in Japan, the more likely it is to lead to non-enrollment in the NP.*
7	*The fewer years of education, the more likely it is to lead to non-enrollment in the NP.*
8	*Poor Japanese conversational ability or reading ability both make it more likely to lead to non-enrollment in the NP.*
9	*The younger the age, the more likely it is to lead to non-enrollment in the NP.*
10	*Enrollment in Japan's private pension makes it less likely to result in non-enrollment in the NP.*
11	*Enrollment in a public pension of a country other than Japan makes it more likely to result in non-enrollment in the NP.*
12	*The country or region of nationality possessing a universal pension scheme or an equivalent system makes it less likely to result in non-enrollment in the NP.*
13	*Residence statuses that are under work activity restrictions make it more likely to result in non-enrollment in the NP.*

4 Results and Diagnostics

Table 9 shows the Probit regression results for Model 1. First, the analysis for Model 1 revealed that several factors significantly negatively impact national pension enrollment. These factors include having an employment status as a student, household members' total financial assets being "None" or "Unknown," duration already stayed in Japan for less than a year, participating in private pension plans in Japan, and participating in public pension plans in countries other than Japan. Specifically, when employment status shifts from the reference group of "Regular employee/business owner" to "Student," the likelihood of not enrolling in the NP increases by an average of 42.4% under constant conditions. Similarly, when household members' total financial assets decrease from "Over 3 million yen" to "None," the probability of not enrolling increases by an average of 18.3%. Additionally, reducing the duration of residence in Japan from "Over 10 years" to "Less than 1 year" leads to an average increase of 20.7% in the likelihood of not enrolling. Furthermore, individuals participating in Japan's private pension plans have a 22.9% higher average probability of not enrolling in the NP compared to those who do not participate. Likewise, those participating in public pension plans of countries other than Japan have a 30.7% higher average probability of not enrolling compared to non-participants.

Conversely, factors that significantly positively impact NP enrollment include the number of years of education and having a universal pension scheme or equivalent system in one's country or region of nationality. Specifically, for every additional year of education, the probability of not enrolling decreases by an average of 1.8%. Moreover, individuals from countries or regions with a universal pension scheme or equivalent system have an average 13% lower probability of not enrolling compared to those from areas without such systems.

Table 9: Probit regression results (Model 1)

Variable	Coef.	$\Delta x/\Delta y$
Employment status (Ref. : Regular employee/Business owner)		
Dispatched worker/Contract employee/Advisory staff	0.063	0.023
	[0.228]	(0.084)
Part-time/Temporary job	-0.278	-0.108
	[0.240]	(0.093)
Self-employed/Freelancer	-0.201	-0.078
	[0.388]	(0.152)
Student	**-1.144*** **	**-0.424*** **
	[0.234]	**(0.078)**
Helping with family business/Home-based job/Employment status unknown	0.549	0.178
	[0.735]	(0.198)
Unemployed/Job-seeking	-0.359	-0.140
	[0.233]	(0.091)
Total financial assets of household members (Ref. : Over 3 million yen)		
Less than 3 million yen	-0.249	-0.099
	[0.197]	(0.078)
None	**-0.461***	**-0.183***
	[0.204]	**(0.079)**
Don't know	-0.376†	-0.149†
	[0.196]	(0.077)
Presence of overseas remittance behavior	0.136	0.054
	[0.172]	(0.069)
Self-assessed health status is worse	0.164	0.065
	[0.221]	(0.088)
Plans to permanently reside in Japan	0.097	0.039
	[0.157]	(0.063)
Duration already stayed in Japan (Ref. : Over 10 years)		
Less than 1 year	-0.531	-0.207†
	[0.334]	(0.125)
1 to 3 years	-0.297	-0.118
	[0.250]	(0.096)
4 to 9 years	-0.131	-0.052
	[0.224]	(0.089)
Years of education	**0.045***	**0.018***
	[0.019]	**(0.007)**
Japanese conversational ability is worse	-0.229	-0.090
	[0.214]	(0.083)
Japanese reading ability is worse	-0.212	-0.083
	[0.190]	(0.074)
Age	-0.007	-0.003
	[0.010]	(0.004)
Enrollment in Japan's private pension	-0.620†	**-0.229***
	[0.340]	**(0.110)**
Enrollment in public pension of a country other than Japan	**-0.868** **	**-0.307** **
	[0.274]	**(0.078)**
The country or region of nationality possesses a universal pension scheme or an equivalent system	0.328†	0.130†
	[0.171]	(0.067)
Const.	0.269	
	[0.567]	
Obs.	398	
Prob > chi2	0.000	
Pseudo R2	0.155	
McFadden R2	0.286	
AIC	511.432	
Area under ROC curve	0.746	

NOTE: [ ] contains robust standard deviations. ( ) contains delta-method standard errors. †p<0.10, * p<0.05, ** p<0.01, *** p<0.001.

The regression results for Model 2 are similar to those for Model 1 (see Table 10). The total financial assets of household members being "None," participation in private pension plans in Japan, and participation in public pensions in countries other than Japan all significantly negatively affect enrollment in the NP. Furthermore, we found that compared to individuals whose residence statuses have no work activity restrictions, those with restricted work activity residency statuses have a 41.4% higher average probability of not enrolling in the NP. Conversely, similar to the results of Model 1, in the regression results of Model 2, we still observe that the years of education and having a universal pension scheme or equivalent system in the country or region of nationality significantly positively impact enrollment in the NP.

For Model 2, considering the high proportion of students among those with residence statuses under work activity restrictions, and knowing from Model 1 that student status significantly affects NP enrollment, we excluded student samples to analyze whether other residence statuses under work restrictions significantly impact NP enrollment. The results are shown in Table 11. The results indicate that other residence statuses under work restrictions, specifically the "Dependent" residence status, still have a significant negative impact on NP enrollment. Simultaneously, we noted that the significance of the coefficients and marginal effects for the variable "The country or region of nationality possesses a universal pension scheme or an equivalent system" has disappeared. This may suggest that the significant positive effect of having a universal pension plan or an equivalent system in one's country or region of nationality primarily manifests among the student population.

Table 10: Probit regression results (Model 2)

Variable	Coef.	$\Delta x/\Delta y$
Residence statuses that are under work activity restrictions	**-1.110*** **	**-0.411*** **
	[0.201]	**(0.065)**
Total financial assets of household members (Ref. : Over 3 million yen)		
Less than 3 million yen	-0.244	-0.096
	[0.196]	(0.077)
None	**-0.465***	**-0.184***
	[0.204]	**(0.079)**
Don't know	**-0.449***	**-0.178***
	[0.195]	**(0.076)**
Presence of overseas remittance behavior	0.191	0.076
	[0.173]	(0.069)
Self-assessed health status is worse	0.109	0.044
	[0.227]	(0.091)
Plans to permanently reside in Japan	0.129	0.051
	[0.154]	(0.061)
Duration already stayed in Japan (Ref. : Over 10 years)		
Less than 1 year	-0.425	-0.166
	[0.337]	(0.128)
1 to 3 years	-0.198	-0.079
	[0.249]	(0.099)
4 to 9 years	-0.042	-0.017
	[0.223]	(0.089)
Years of education	**0.057** **	**0.023** **
	[0.019]	**(0.008)**
Japanese conversational ability is worse	-0.281	-0.110
	[0.215]	(0.083)
Japanese reading ability is worse	-0.182	-0.072
	[0.188]	(0.074)
Age	-0.010	-0.004
	[0.010]	(0.004)
Enrollment in Japan's private pension	**-0.684***	**-0.250***
	[0.336]	**(0.105)**
Enrollment in public pension of a country other than Japan	**-0.783** **	**-0.283** **
	[0.272]	**(0.082)**
The country or region of nationality possesses a universal pension scheme or an equivalent system	0.283†	0.112†
	[0.170]	(0.067)
Const.	0.099	
	[0.557]	
Obs.	396	
Prob > chi2	0.000	
Pseudo R2	0.160	
McFadden R2	0.293	
AIC	496.505	
Area under ROC curve	0.751	

NOTE: [ ] contains robust standard deviations. ( ) contains delta-method standard errors. †p<0.10, * p<0.05, ** p<0.01, *** p<0.001.

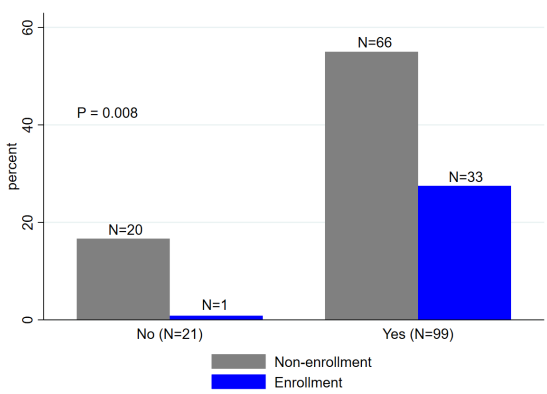
Table 11: Probit regression results (Model 2) (Excluding students)

Variable	Coef.	$\Delta x/\Delta y$
Residence statuses that are under work activity restrictions	**-0.863****	**-0.329****
	[0.327]	**(0.110)**
Total financial assets of household members (Ref. : Over 3 million yen)		
Less than 3 million yen	**-0.626****	**-0.230****
	[0.243]	**(0.086)**
None	**-0.728****	**-0.271****
	[0.249]	**(0.088)**
Don't know	**-0.677***	**-0.251****
	[0.266]	**(0.096)**
Presence of overseas remittance behavior	0.070	0.027
	[0.181]	(0.071)
Self-assessed health status is worse	0.158	0.061
	[0.270]	(0.102)
Plans to permanently reside in Japan	-0.077	-0.030
	[0.171]	(0.067)
Duration already stayed in Japan (Ref. : Over 10 years)		
Less than 1 year	-0.733†	-0.284†
	[0.429]	(0.154)
1 to 3 years	-0.218	-0.086
	[0.297]	(0.118)
4 to 9 years	0.158	0.060
	[0.247]	(0.093)
Years of education	**0.047***	**0.019***
	[0.021]	**(0.008)**
Japanese conversational ability is worse	-0.366	-0.145
	[0.259]	(0.102)
Japanese reading ability is worse	-0.225	-0.088
	[0.202]	(0.080)
Age	-0.014	-0.005
	[0.011]	(0.004)
Enrollment in Japan's private pension	**-0.701***	**-0.272***
	[0.339]	**(0.122)**
Enrollment in public pension of a country other than Japan	**-0.863****	**-0.330****
	[0.308]	**(0.104)**
The country or region of nationality possesses a universal pension scheme or an equivalent system	0.185	0.073
	[0.192]	(0.075)
Const.	0.846	
	[0.660]	
Obs.	276	
Prob > chi2	0.000	
Pseudo R2	0.168	
McFadden R2	0.313	
AIC	350.793	
Area under ROC curve	0.759	

NOTE: [ ] contains robust standard deviations. ( ) contains delta-method standard errors. †p<0.10, * p<0.05, ** p<0.01, *** p<0.001.

Regarding the hypothesis that the presence of a universal pension scheme or an equivalent system in the country or region of nationality has a more significant positive impact on the participation of students in the national pension, we conducted a χ^2 test to determine if there is a significant difference between the student samples from countries or regions with such systems (Yes group) and those without (No group). The results showed significant differences between the two groups (see Figure 4). However, we found that the countries or regions in the Yes group are relatively more economically developed compared to the No group (see Table 5). We considered that this significant difference might stem from varying economic conditions. Therefore, for the student samples, we analyzed the impact of whether the country or region of nationality has a universal pension system, controlling for individual and family economic conditions (including total financial assets and annual income), with results presented in Table 12. Although the sample size is limited, the variable representing whether the country or region of nationality has a universal pension system showed significance at the 1% level in both coefficients and marginal effects, further validating our hypothesis.

Figure 4: Enrollment Status among Student Samples



NOTE: "Yes" means that the country or region of nationality possesses a universal pension scheme or an equivalent system, while "No" indicates that the country or region of nationality lacks a universal pension scheme or an equivalent system.

Table 12: Probit Regression Results for Students Sample

Variable	Coef.	$\Delta x/\Delta y$
Total financial assets of household members (Ref. : Over 3 million yen)		
Less than 3 million yen	**0.781***	**0.261***
	[0.386]	**(0.131)**
None	0.325	0.094
	[0.414]	(0.123)
Don't know	0.157	0.043
	[0.334]	(0.090)
Annual income (Ref. : Less than 1.5 million yen)		
1.5 to 3 million yen	-0.000	-0.000
	[0.426]	(0.139)
None	-0.045	-0.014
	[0.307]	(0.098)
Don't know	-0.651	-0.164
	[0.553]	(0.108)
The country or region of nationality possesses a universal pension scheme or an equivalent system	**1.425****	**0.298****
	[0.464]	**(0.058)**
Const.	**-2.071*****	
	[0.523]	
Obs.	120	
Prob > chi2	0.016	
Pseudo R2	0.105	
McFadden R2	0.105	
AIC	144.036	
Area under ROC curve	0.687	

NOTE: [ ] contains robust standard deviations. ( ) contains delta-method standard errors. †p<0.10, * p<0.05, ** p<0.01, *** p<0.001.

5 Discussion

Based on the above analysis, we conclude that residence statuses under work activity restrictions, lower total financial assets of family members, fewer years of education, participation in private pension plans in Japan, and participation in public pension plans outside Japan, all significantly negatively impact foreign residents' enrollment in the NP. Apart from the impact of participating in Japan's private pension plans, the other results

are consistent with the corresponding hypotheses. Furthermore, our research indicates that having a universal pension system or an equivalent system in the country or region of nationality has a positive effect on enrollment in the NP, and this effect is particularly pronounced among the student population.

Consistent with our hypothesis, foreign residents in Japan who hold visas with work activity restrictions, compared to those without such restrictions, may be forced to delay payment of NP premiums or even refrain from participating in the NP due to lower or unstable income levels. Additionally, apart from income limitations resulting from work activity restrictions, lower total financial assets of household members, including overseas assets, may also significantly impact the enrollment of foreign residents in Japan's NP. The finding that liquidity constraints significantly impact the participation of foreign residents in Japan's national pension is consistent with the research conclusions among the Japanese population (Suzuki and Zhou, 2001).

Regarding the impact of educational level on participation in the NP, the research results are consistent with our hypothesis. In our analysis, the number of years of education is used as a proxy variable to measure an individual's understanding of the Japanese public pension system. The estimated results indicate that the number of years of education significantly affects an individual's understanding of the public pension system, thereby influencing their decision to participate in the NP. This suggests that compared to foreign residents with lower educational levels, those with higher education are less likely to abstain from participating in the NP.

In terms of the relationship between private and national pensions in Japan, numerous studies on Japanese samples suggest that there may be a complementary relationship between the two (Yuda, 2006). However, our research findings on foreign residents in Japan are contrary to this, which also refutes our hypothesis. To ensure that the pension sustains a certain standard of living after retirement, the NP serves as a basic pension, and

the insured can usually choose to join private pension plans as a supplement. However, our estimated results indicate that among the foreign population in Japan, there may be a substitutive relationship between Japan's private pensions and the NP. Regarding the significant differences between this result and previous studies on Japanese nationals, we speculate that this may stem from the identity differences between foreign residents in Japan and Japanese nationals. Compared to Japanese nationals, foreign residents in Japan face greater uncertainty about whether to choose or be able to permanently reside in Japan. Compared to the NP, which requires mandatory participation and offers a lump-sum refund limited to recent years upon withdrawal, foreign residents in Japan might prefer private pensions with higher liquidity, even though they come with a relatively heavier financial burden than the NP.

Similarly, there is a degree of substitutability between Japan's NP system and public pension systems in other countries. Foreign residents in Japan may primarily opt out of paying NP premiums due to overlapping public pension payments. Although Japan has currently signed and implemented social security agreements with 24 countries, our research indicates that individuals from countries that have not signed such agreements, or foreign residents holding residence statuses not covered by these agreements, are very likely to forego paying into NP after enrolling in public pension insurance from other countries.

Regarding the proxy variable for awareness of public pension participation, specifically whether an foreign resident's country or region of nationality possesses a universal pension scheme or an equivalent system, our regression analysis revealed that this variable is positively and significantly associated within the student sample. Conversely, in the non-student sample, although the regression coefficient remains positive, it does not achieve statistical significance at the 10% level, potentially attributable to our limited sample size. However, the coefficient may still indicate directional significance, warrant-

ing further consideration. These findings support our hypothesis that the existence and prevalence of a universal pension system in a foreign resident's country or region of nationality can influence their awareness and participation in public pension schemes in the host country, particularly among foreign residents who are students.

Regarding Japanese language proficiency, our results do not support the hypothesis that lower Japanese communication or reading abilities significantly affect the NP enrollment of foreign residents in Japan. Nevertheless, the coefficients and marginal effects of the two dummy variables for language proficiency are negative, with p-values approaching 10%. This suggests that Japanese language proficiency may have a potential significant impact on NP enrollment, and thus warrants further investigation.

On the other hand, our research findings diverge from our hypotheses in certain aspects. For instance, our analysis did not support the hypothesis that "Overseas remittance behavior causes liquidity constraints, which in turn lead to non-enrollment in the NP." This suggests that although remitting money overseas might result in some foreign residents in Japan refraining from joining the NP due to liquidity constraints, this factor does not significantly impact their participation in the NP. Moreover, the coefficients and marginal effects of this variable are positive, indicating a potential positive correlation between overseas remittance behavior and participation in the NP. This outcome challenges our initial assumption of a negative relationship between the overseas remittance behaviors of foreign residents in Japan and delinquency in public insurance contributions. Additionally, while prior studies using Japanese samples mentioned significant impacts of expected age of death and age effects on non-enrollment in the NP, we did not observe significant coefficients or marginal effects for the proxy variables of expected age of death—self-assessed health status and age—in our study. Moreover, the proxy variable for expected duration of stay in Japan—plans to permanently reside in Japan—also did not significantly affect non-enrollment in the NP.

Regarding the limitations of this study, it should first be noted that some nationalities surveyed were not represented by specific country names but were instead categorized regionally, such as "Other North American, European, and Oceanian countries." Here, we infer the status of the entire region based on whether the major countries within it have implemented and popularized a universal pension system, but this method may lack rigor. Secondly, there are certain issues with the student samples. In Japan, high school and higher-level students with annual incomes below a certain threshold, regardless of nationality, can apply for the "National Pension Contribution Special Payment System." Based on the income of the previous fiscal year, approved students can defer payment of that fiscal year's NP contribution for up to ten years (Japan Pension Service, 2024a). Therefore, it cannot be ruled out that some students, due to cultural and language differences, misunderstand this system and believe that they are not required to participate in the NP. This may have a certain impact on the research results.

6 Conclusions

This study explores the factors leading to the non-participation of foreign residents in Japan's NP. Regression analysis results indicate that factors such as student status or other residence statuses with employment restrictions, liquidity constraints, years of education, and participation in private pensions in Japan or public pensions abroad, may significantly influence foreign residents' decisions to participate the NP. Additionally, by examining whether the country or region of foreigners' nationality implements and popularizes public pension systems as a proxy variable, the study found that awareness of public pensions might be a potential factor influencing their participation in the NP, particularly evident among the student population. On the other hand, hypotheses regarding the significant impact of expected age of death, age effects, expected duration of stay

in Japan, or overseas remittance behavior on decisions to join the NP were not supported by the data.

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