International Students Upon Graduation:

Why do they choose to work in Japan?

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Abstract: International students are considered a crucial source of international immigrants, and attracting them is seen as an effective measure to alleviate the depopulation and aging population issues in Japan. Previous studies on international students have primarily focused on those who have graduated for various lengths of period, and the mechanisms behind their decisions regarding choice of country may be mixed. This study distinguishes it from more conventional literature on international students' choices of countries by focusing on students upon graduation. I utilize the data from the 2015-2017 *Survey of International Students' Career and Academic Degrees* (*SISCAD*) and the logit model to conduct econometric analyses. The results indicate that students funded by the Japanese Government Scholarship are less likely to stay in Japan. The ratio of per capita GDP in one's home country to that of Japan is negatively related to the student's retention possibility, but this only applies to student groups from countries less developed than Japan. The results of distance also vary among student groups from countries more (or less) developed than Japan: significantly positive for the more developed and significantly negative for the less developed. Those who have secured jobs are more likely to stay in Japan compared to the unemployed. International students from certain specialties and education levels are also found to be more (or less) likely to work in Japan upon graduation. These results can provide insights for the Japanese government to implement effective strategies for attracting international students to work in Japan.

Key Words: international students, upon graduation, choice of country, affecting factors, Japan

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1. Introduction

Most developed countries have undergone significant changes in their immigration policies in response to domestic challenges such as domestic population aging, fertility decline, and labor shortage in recent years. Economic criteria have become more important than social criteria in many countries (Akbari & MacDonald, 2014). Among various categories of immigrants, international students have garnered increasing attention (Akbari & MacDonald, 2014). While host countries generally expect skilled immigrants to help meet their domestic labor market demands, there remains a lack of recognition for the educational credentials and work experiences acquired by immigrants in their countries of origin. Meanwhile, host countries aim to select immigrants with lower integration costs to avoid social instability. Nevertheless, assessing the potential language and cultural barriers an immigrant might encounter, as well as the potential societal challenges they may pose, can be a complex task.

In such a context, the roles of international students are highlighted, because they are typically individuals who are young, well-educated, and with a high potential of acculturation. First, they receive their education and graduate in the host country, and this ensures that their qualifications are fully recognized and professionally relevant locally (Hawthorne, 2005). Meanwhile, they have living experience in the host country for a certain period, enabling them to

become familiar with the local language and culture. As a result, international students possess a high potential for better integration into the labor market as well as social spheres (Akbari & MacDonald, 2014). It is therefore essential not only to attract them to come but also to encourage them to stay and work in the host country. Thus, studying international students and their migration potential becomes a critical task for enhancing human capital development and bolstering a country's competitiveness (Bol & Werfhorst, 2013; Zhanbayev et al., 2021; Zhanbayev et al., 2020).

Most OECD countries have implemented policies to encourage international students to stay upon graduation, such as options to change residence permits before graduation, post-graduate extension for seeking employment or being self-employed (Kamm & Chaloff, 2022). Japan has also invested significant effort in attracting and retaining international students. However, the proportion of international graduates who have found jobs in Japan, out of all graduates (including those who are going to pursue further education or are undecided) that year, is merely less than 40% (36.9% in 2019, 37.7% in 2021) (JASSO, 2021a, 2023). Contrastly, over half (54.9% in 2019, 58.0% in 2021)[i] of international students express a desire to work in the country (JASSO, 2021b, 2022). This gap indicates the potential for Japan to increase the retention rate of international students.

Whether international students choose to remain and work in the host country after graduation is a crucial segment of their migration decisions.

However, the choice of country by international students is largely under-researched in the literature yet. Previous studies on international students have primarily focused on those who have graduated for various periods, and the mechanisms behind their decisions regarding choice of country may be mixed. Empirical studies investigating international students upon graduation are insufficient.

This study uses data from the *2015-2017 Survey on International Students' Career and Academic Degrees (SISCAD),* conducted by the Japan Student Services Organization (JASSO)[ii]. I employ the logit model and examine the factors affecting the choices between the home country and the host country (i.e. Japan).

The following sections are composed as follows. Section 2 reviews the literature on the affecting factors of international students' return migration. Section 3 describes the methodology. Section 4 displays the estimation results. Section 5 presents the discussion and conclusions.

2. Literature review

Exant research on international students has mainly been focused on issues such as the "brain drain" or "brain circulation" effect for the country of origin (Dustmann et al., 2011), selection policies of immigrants favoring international students (Hawthorne, 2005), the impact of human capital portability frictions on the quality and quantity of international students in host countries (Arenas,

2021). A few studies focusing on the choice of country by international students mainly target those who have previously graduated for various lengths of period. Empirical studies investigating international students upon graduation are insufficient.

Upon graduation, an international student faces the choice of which country to work in, and optional choices are related to different types of migration: returning to their home country (i.e. return migration), retaining in the host country they accepted education (i.e. migration), or going to a third country (i.e. chain migration). Why an international student chooses to stay in the host country is integral to the realm of international migration. Therefore, exploring the factors influencing this decision can draw insights from studies on broader international migration patterns.

2.1 Prospective income

In the well-known neoclassical economics perspective, a higher expected gain increases the probability of migration, while a higher cost decreases it (Sjaastad, 1962; Massey et al., 1993). The international students' choice of country is fundamentally based on the return of human capital, which is the key expected gain. According to Dustmann et al.'s (2011) theoretical model, migrations happen when people evaluate and decide where human capital can be acquired more efficiently, and where the return to human capital is higher. This idea does not only apply to learning on the job but also applies to learning in school.

International students will also choose their work country based on their prospective income. For example, Rosenzweig (2008) finds that among various home countries, the ones with higher wages are associated with higher return rates of foreign students. Such return migration can be explained by the school-constraint model of Rosenzweig (2006). According to it, if the home country has high returns to human capital, but has a shortage of domestic opportunities to invest in human capital (i.e. the education resources and opportunities are not adequate in one's home country), international students will be prone to return to reap the rewards of the high return to education.

Not only the absolute wage level but also the relative position in the wage distribution in the home country are found to affect return migration. Co et al. (2000) find that returned students will be able to enter the home country wage distribution at a relatively higher point upon return. International students who study abroad and then return to their home country have an economic performance premium (in terms of wage) of 3.7% compared to graduates from Norway (Wiers-Jenssen & Try, 2005) and around 20% for students from Mexico (Palifka, 2003). The relative position in the wage distribution will cause return migration of international students to occur, even when the average wage level is lower in the home country than in the host country.

Rosenzweig (2006) also proposes the other model - the migration model – when the return to education is low in an international student's home country. In that case, the student tends to choose to stay in the host country.

2.2 Employment opportunities

When talking about expected gains, employment probabilities should also be taken into account besides wage level (Todaro, 1980; Greenwood,1985).

Bijwaard and Wang (2016) utilized immigration registration data between 1999 and 2007, leveraging information on entries, visa statuses, employment records, and exits (if any) to select international student samples. They find that foreign students are found to leave the Netherlands faster if they are unemployed. However, whether these students will return upon finding a job varies among their home countries. Students from less developed countries are more likely to return even after being employed in the host country Netherlands. This counterintuition result is explained by the speculation that the labour market experience in the Netherlands gives the students better job opportunities in their home or a third country. Another explanation Bijwaard and Wang (2016) offers is that the students are target savers, who leave when their accumulated savings exceed some threshold. Meanwhile, students from developed (including EU) countries are found to be hardly affected by employment status.

2.3 Cost

In terms of cost, transportation costs have been frequently examined in international migration studies, while no empirical test has been done in international students' studies. Some have argued that migration applies to gravity law in the way that geographic proximity facilitates the exchange

relationship. The spatial distance between countries is often used as a proxy for transportation costs, such as in Ranis and Fei (1961). It is also important to notice that the gravity law of migration requires a set of restrictive assumptions. It is appropriate to view the gravity model as a useful starting point in the analysis of migration behavior, to expect possible deviation from the real world, and to study how and why there are deviations (Vanderkamp, 1977).

2.4 Others

Some other factors have been found to impact the decision of international students to migrate (i.e. retain in the host country), such as resources, academic performance, motivation, and values formed in the family (Bol & Werfhorst, 2013; Coleman, 1966; Sirin, 2005). The social positions of an international student's parents also influence the social position of the student, and hence the choice of migration (Blau & Duncan, 1967).

Additionally, Bijwaard and Wang (2016) have examined the impact of family formation and found that marriage in the host country makes international students more prone to remain there. In an economic crisis with a high (national) unemployment rate, international students are more prone to leave the host country because it is harder for them to find a job. The duration of stay is found to be positively related to the return migration. That means the longer a student stays in the host country, the higher their probability of returning to the home country. Apparently, the return migration of international students may change over time. It would be misleading to mix students who graduated

over various periods together.

3 Methodology

3.1 Data

In this chapter, I use microdata from the *2015-2017 Survey on International Students' Career and Academic Degrees (SISCAD),* conducted annually by JASSO. The survey subjects include all the newly graduated international students in Japan for the survey year. The information is collected and reported by each educational institute. Among all the graduates, those who are going to pursue further education upon graduation are excluded from the analysis dataset of this study, and those who are either going to work or are still undecided yet are included. Data on per capita GDP is from the International Monetary Fund (IMF, 2023). Data on distance is from DBC (n.d.), and it is calculated by the distance from the capital city of a country to Tokyo. In total, there are 122,728 valid observations.

Regarding the variables, I used the ratio of per capita GDP in the origin country compared to Japan. The value of the ratio is between 0.0037 to 3.0484, with an average of 0.2786 and a standard deviation of 0.2872.

The average distance to Japan is 3,291 kilometers, with the minimum of 1,153 kilometers and the maximum 18,524 kilometers. The standard deviation is 2,242 kilometers. Most of the observations came from countries in Asia,

accounting for 93.32%. The second largest region of origin is Europe, although the share is largely smaller (3.22%). International students from Asian countries have the highest retention rate, at 57.7%, while those from the Middle East show the lowest retention rate, at 23.57%.

3.79% of the observations are government-funded. The corresponding retention rate for government-funded students is 40.19%. [iii]

Approximately 56% of the sample students have found employment, with 74.98% of them opting to remain in Japan. 18.84% of the observations are still searching for employment, with roughly 51.97% choosing to stay in Japan. The remaining 24.76% of the observations belong to '*others*', and their retention rate in Japan is notably lower, reaching only 18.48%.

Regarding the specialty, 35.38% of the observations are in *Humanities and Social Sciences* (人文社会科学), and 13.45% are in *Engineering and Technical*（工学/工業）, while other specialties are mostly less than 2%. The specialties with the highest retention rate are *Home Economics*（家政）and *Others* (その他）, both around 60%. The specialties with the lowest retention rates are *Agriculture and Farming* （農学/農業), and *Health (Medicine/Dentistry/Nursing)* （保健（医薬/歯学/看護））, with retention rates around 35%.

Regarding the education level, most of the observations graduated from *Vocational Schools (Specialized Courses)* （専修学校（専門課程）), accounting for 26.08%. The second largest group of graduates are from the *University Undergraduate Program* （大学学部), accounting for 22.97%. Graduates from

Japanese Language Institutes （日本語教育機関) and *Master's Programs* （修士課程） represent 19.82% and 19.72% of the total, respectively. The highest retention rates are observed among graduates from *Vocational Schools (Specialized Courses)* （専修学校（専門課程））and *Junior College*（短期大学）, both exceeding 75%. The lowest retention rate is seen in graduates from *Preparatory Education Program* (準備教育課程）and is around 28%.

Table 1. Definition and description of variables

Variable	Definition	Nature
Independent variable		
Choice	One's choice of country to work in upon graduation: 1=Home country, 2=Japan, 3=A third country.	Categorical
Main explanatory variables		
pGDPtoJP	The ratio of per capita GDP in one's home country to that in Japan in the year of one's graduation.	Continuous
Education	Which kind of educational institute is one graduated from: 1=Japanese Language Institutes, 2=Doctoral Program, 3=Master's Program, 4=Professional Degree Program, 5=University Undergraduate Program, 6=Junior College, 7=College of Technology, 8=Vocational Schools (Specialized Course), 9=Preparatory Education Program	Categorical
Specialty	Which specialty is one majored in: 1=Humanities and Social Sciences, 2=Science, 3=Engineering / Industry, 4=Agriculture / Farming, 5= Health (Medicine/Dentistry/Nursing), 6= Health (excluding Medicine/Dentistry/Nursing), 7=Home Economics, 8=Education, 9=Arts, 10=Others.	Categorical
Employstatus	Whether a graduate has found a job: 1= Having found employment, 2 = In search of employment, 3 = Others (Undecided).	Categorical
Distance	Distance from the capital city of a graduate's home country to Tokyo (1000 km).	Continuous
GovFunded	Whether a graduate is funded by the Japanese Government (MEXT) Scholarship: 1=yes, 0=otherwise.	Dummy
RegionOrigin	Which region is one's home country in: 1=Asia, 2=Middle East, 3=Africa, 4=Oceania, 5=North America, 6=Central and South America, 7=Europe	Categorical

Table 2. Descriptive statistics on the observations

Variable	Obs	Mean	Std. dev.	Min	Max
pGDPtoJP	122,728	0.2786	0.2872	0.004	3.048
Distance	122,728	3.2909	2.2442	1.153	18.524

Table 3. Descriptive statistics on the observations (weighted)

Item	Total		Home country	Japan	A third country	Others
No. of observations	122,728		44,840 (36.54%）	69,223 (56.40%)	2,387 (1.94%)	6,278 (5.12%)
GovFunded	4,646	100%	49.33%	40.19 %	4.41%	6.07%
Employstatus						
Having found employment	68,674	100%	24.12%	74.98%	0.90%	0
In search of employment	23,123	100%	43.87%	51.97%	4.16%	0
Others	30,391	100%	58.63%	18.48%	2.60%	20.30%
Education	**127,728**					
Japanese Language Institutes	24,319	100%	56.07%	38.91%	1.32%	3.70%
Doctoral Program	9,046	100%	43.61%	41.12%	4.53%	10.73%
Master's Program	24,208	100%	38.24%	50.76%	3.61%	7.39%
Professional Degree Program	2604	100%	41.44%	46.66%	4.61%	7.30%
University Undergraduate Program	28,194	100%	32.40%	58.80%	1.56%	7.24%
Junior College	978	100%	21.37%	75.36%	0.31%	2.97%
College of Technology	71	100%	47.89%	50.70%	1.41%	0
Vocational Schools (Specialized Course)	32,006	100%	20.76%	77.55%	0.66%	1.02%
Preparatory Education Program	1,302	100%	69.05%	28.11%	0.31%	2.53%
Specialty [2]	**67,305**					
Humanities and Social Sciences	24,418	100%	35.29%	54.27%	2.95%	7.49%
Science	1,069	100%	41.72%	48.08%	3.74%	6.45%
Engineering / Industry	9,054	100%	35.79%	52.82%	4.01%	7.39%
Agriculture / Farming	1440	100%	56.94%	35.42%	1.60%	6.04%
Health (Medicine/Dentistry/Nursing)	822	100%	52.31%	34.06%	2.92%	10.71%
Health (excluding Medicine/Dentistry/Nursing)	339	100%	38.35%	51.03%	2.36%	8.26%
Home Economics	342	100%	38.30%	59.65%	1.46%	0.58%
Education	989	100%	32.05%	57.74%	3.24%	6.98%
Arts	1,321	100%	35.05%	57.68%	0.45%	6.81%
Others [2]	27,511	100%	36.53%	59.60%	0.97%	2.91%

Notes: 1) For the variable *Specialty*, there is no information available from the 2015 survey, and only observations from the 2016 and 2017 surveys have such information. For all other variables, data are collected from the 2015 to 2017 surveys.

2) The large number of observations in the '*Others'* specialty is mainly due to the 23,617 observations who have chosen '*professional/ preparatory/ Japanese*' in the 2017 survey.

3.2 Model specification

Generally, a graduate *k* chooses a country to work in among three options:

(1) *home country*, (2) *Japan*, (3) *a third country*. Samples choosing the option (4) *others* are excluded from the following estimation. Among the three choices, I focus on comparing the decision to work in Japan with returning to the home country, as outlined by the research purpose.

The international student k's utility derived from choosing country j is denoted as U_{kj} and it is divided into observed parts V_{kj} and unobserved parts ε_j. I designate the first group (j = 1, i.e. *home country*) to serve as the baseline category. In the multinomial logit model,

$$U_{kj} = V_{kj} + \varepsilon_j = \log\left(\frac{\text{Pr }(Choice=j|k)}{\text{Pr }(Choice=1|k)}\right) = \beta_{kj} \cdot X_{kj} + \gamma_{kj} \cdot Year_{kj} + C_j + \varepsilon_j,$$

where j = 2, 3. X is the vector of variables representing personal attributes. *Year* is dummy variable for each year. β is a set of the regression coefficients associated with k's choice of country j. γ is a vector of coefficients associated with the year-fixed effect. C is the constant value and ε is a disturbance term.

4 Results

Due to data availability, Model (1) uses *SISCAD* data from 2015 to 2017, while Model (2) uses *SISCAD* data in 2016 and 2017 and adds the variable of *Specialty* into the model. The results of the coefficients for the variables are reported in Table 4.

Table 4. Analysis results of logit models (Coefficient)

Variable	Model (1)	Model (2)
Samples in survey year	2015-2017	2016-2017
GovFunded	-0.5335***	-0.3793***
pGDPtoJP	-0.6041***	-0.2443***
Distance	-0.0134***	-0.0404***
EmployStatus: Having found employment	1.7461***	1.8647***

Education		Model (1)	Model (2)
	Doctoral Program	-0.8122***	-0.6844***
	Master's Program	-0.3320***	-0.3454***
	Professional Degree Program	-0.4690***	-0.5595***
	University Undergraduate Program	(ref)	(ref)
	Junior College	0.5180***	0.5871***
	College of Technology	-0.7158**	-0.7274*
	Vocational Schools (Specialized Course)	0.9084***	0.9688***
	Preparatory Education Program	-1.0680***	-1.2181***
	Japanese Language Institutes	-0.8598***	-0.9028***

Specialty		Model (1)	Model (2)
	Humanities and Social Sciences		(ref)
	Physical Science		0.0533
	Engineering / Industry		0.0143
	Agriculture / Farming		-0.6603***
	Health (Medicine/Dentistry/Nursing)		-0.5281***
	Health (excluding Medicine/Dentistry/Nursing)		-0.047
	Home Economics		0.1054
	Education		0.4310***
	Arts		0.6473***
	Others		0.1054*

	Model (1)	Model (2)
Time-fixed effect	YES	YES
Constant	-0.1390***	-0.3495***
No. of observations	116,450	63,575
Pseudo R²	0.1703	0.1749

*Note*s: 1) Multinomial logit models are estimated by taking *Choice = 'Home country'* as the reference group. In the above table, the results are related to *Choice = 'Japan'*. The results related to another option of the explained variable (i.e. *Choice = 'A third country'*) are omitted for short.

2) Coefficients for the variables are reported. *, **, and *** denote significance at the 5%, 1%, and 0.1% levels, respectively.

4.1 Per capita GDP ratio

The regional economic development level can be viewed as a rough proximate to the income level. Generally, the greater the per capita GDP, the better the income prospects. The results show that the per capita GDP ratio of a student's home country to Japan is negatively associated with one's choice of working in Japan (Model (1) and (2) in Table 4). These indicate that international students from countries with higher economic development levels are less likely to stay in Japan upon graduation, aligning with findings from the United States (Rosenzweig , 2008).

This study also estimates the heterogeneity effect of the per capita GDP ratio by dividing the samples into two groups: students from countries with a per capita GDP equal to or greater than that of Japan, and students from countries with a per capita GDP lower than that of Japan. The results show that the coefficient of the per capita GDP ratio is significant and negative only for the student group with this ratio lower than one (Model (1b), (2b) in Table 5). This result can be explained by the fact that, for international students from countries less developed than Japan, education in Japan can help them to get relatively higher payments compared to their domestic counterparts. Consequently, they can achieve a relatively higher position in their home country's wage distribution as suggested by Co et al. (2000).

However, for students from countries more developed than Japan, the results for the per capita GDP ratio are insignificant (Model (1a), (2a) in Table 5). No

significant evidence has been found to suggest that expected incomes affect their return migration.

Table 5. Choice of Japan estimates, by sample groups with different per capita GDP ratios

Variable		Model (1a) 2015-2017	Model (2a) 2016-2017	Model (1b) 2015-2017	Model (2b) 2016-2017
Samples		pGDPtoJP >= 1		pGDPtoJP < 1	
GovFunded		-0.3615*	-0.4137	-0.5366***	-0.3816***
pGDPtoJP		-0.3005	-0.1925	-0.9843***	-0.5928***
Distance		0.0927***	0.0606**	-0.0484***	-0.0689***
EmployStatus: Having found employment		1.9675***	1.8998***	1.7486***	1.8719***
Education	Doctoral Program	-0.3449	-0.1394	-0.8173***	-0.7051***
	Master's Program	-0.8623***	-0.8335***	-0.3391***	-0.3540***
	Professional Degree Program	-1.2901***	-1.2666***	-0.4674***	-0.5483***
	University Undergraduate Program	(ref)	(ref)	(ref)	(ref)
	Junior College	1.188	15.2451	0.5207***	0.5894***
	College of Technology	-	-	-0.6654**	-0.7082*
	Vocational Schools (Specialized Course)	-0.7404***	-0.8647*	0.9448***	1.0059***
	Preparatory Education Program	-2.2400***	-3.0924***	-0.9981***	-1.0921***
	Japanese Language Institutes	-2.2099***	-2.1478***	-0.8231***	-0.8653***
Specialty	Humanities and Social Sciences		(ref)		(ref)
	Physical Science		-0.7976		0.0876
	Engineering / Industry		0.0071		0.0356
	Agriculture / Farming		-0.5398		-0.6297***
	Health (Medicine/Dentistry/Nursing)		0.1208		-0.5113***
	Health (excluding Medicine/Dentistry/Nursing)		1.0196		-0.0568
	Home Economics		-0.2008		0.1112
	Education		16.2935		0.4204***
	Arts		0.8751*		0.6622***
	Others		0.1560		0.1038*
Time-fixed effect		YES	YES	YES	YES
No. of observations		3693	1888	112757	61687
Pseudo R²		0.2258	0.2269	0.17	0.1756

Notes: The samples used for Model (1a) and (1b) are from countries with *pGDPtoJP* >= 1, and for Model (1a) and (1b) are from countries with *pGDPtoJP* < 1. Other settings are consistent with the models in Table 4.

4.2 Employment status

The results for employment status in Models (1) and (2) show a positive impact of being employed on the students' retention choice (Table 4). Table 5 shows positive and significant results for international students from countries both less and more developed than Japan. Such results only partially align with the previous findings of Bijwaard and Wang (2016). The results for students from less developed countries are consistent in this study and Bijwaard and Wang (2016). However, for students from more developed countries, this study finds that employed individuals are more likely to stay in the host country while Bijwaard and Wang (2016) find no significant result. The difference may be attributed to the variation in the length of the period after graduation among international students in the two studies. In Bijwaard and Wang (2016), students have graduated for various lengths of period, potentially leading to a mixed mechanism in how employment status affects migration choice. This study, on the other hand, focuses on international students immediately upon graduation, resulting in a more distinct mechanism. It would be intriguing to investigate the temporal changes in international students' return migration following graduation.

Models (1c) and (2c) are estimated by decomposing the unemployed samples into those who are still job hunting and others (Table 6). When using *'others'* as a reference, the coefficients for students in both employment statuses (those who have found employment and those who are still in search of employment)

are positive, indicating a higher preference for seeking employment in Japan within both groups. However, the coefficient is much larger for the employed, indicating that the odds for students who have secured employment to stay in Japan are much larger than for the unemployed. The larger odds observed for the employed imply that some unemployed international students may have to leave Japan unwillingly because they have not found a job in the country yet. Despite the possibility that some students may have predecided to leave Japan, such unwilling leavers possibly exist (for them, unemployment causes the return migration). Policies aimed at helping international students find employment in Japan may help to increase their retention rate.

Table 6. Choice of Japan estimates, results for employment status

	Variable	Model (1)	Model (2)	Model (1c)	Model (2c)
Employ Status	*Having found employment*	1.7461***	1.8647***	2.3765***	2.5996***
	In search of employment			1.1976***	1.3189***
	Others	(ref)	(ref)	(ref)	(ref)
	Time-fixed effect	YES	YES	YES	YES
	Controls: *GovFunded*, *pGDPtoJP*, *Distance*, *Education*	YES	YES	YES	YES
	Controls: *Specialty*	NO	YES	NO	YES
	No. of observations	11,6450	63,575	116,450	63,575
	Pseudo R^2	0.1703	0.1749	0.1700	0.1756

Notes: The variables *EmployStatus* used for Model (1c) and (2c) are the dummy of *Having-found-employment*. The other variables included in the model are consistent with those used in the models in Table 4.

4.3 Education level

This study also investigates various variables regarding human capital, and education level is one of them. The results indicate that graduates from certain educational institutions are less likely to seek employment in Japan compared

to those who have completed *Undergraduate University Programs* (大学学部) (Table 4). These institutions include *Japanese Language Schools* (日本語教育機関), *Preparatory Education Programs* (準備教育課程), *College of Technology* (高等専門学校), *Professional Degree Programs* (専門職学位課程), *Doctoral Programs*(博士課程), and *Master's Programs* (修士課程). This trend suggests that international graduates with higher levels of human capital or those who initially came to Japan for language education are more inclined to leave the country.

Conversely, graduates from *Vocational Schools (Specialized Courses)* （専修学校（専門課程）） and *Junior College*（短期大学）are more likely to stay in Japan for work. It appears that Japan tends to attract and retain individuals who pursue specific job-related training and require fewer years for graduation. Although offering job-related training similarly, the *College of Technology* （高等専門学校） requires a longer period of study (5 years) compared to *Junior Colleges*（短期大学, 2-3 years) and *Vocational Schools (Specialized Courses)* （専修学校（専門課程）, 1-4 years, 2 years in most cases）. That may explain the different results of these educational institutions. Such results indicate that the international students who found an effective way to be equipped with job-oriented human capital, are more likely to remain in Japan.

The above findings imply that the students may have pre-decided to work in Japan or not, and have chosen educational institutions accordingly. These results align with the previous study of Dustmann and Glitz (2011), who argue that migration and education decisions are intertwined.

4.4 Specialty

When analyzing the aspect of specialty, international students specializing in *Humanities and Social Sciences* (人文社会科学) are chosen as the reference group (Table 4). Compared to them, students in the following specialties are more likely to work in Japan: *Arts*（芸術）, *Education*（教育）, and *Others* （その他）. The following specialties are associated with a lower likelihood of staying in Japan: *Agriculture and Farming* （農学/農業), and *Health (Medicine/ Dentistry/Nursing)* （保健（医薬/歯学/看護））. The results for the following specialties are insignificant: *Health (excluding Medicine/Dentistry/Nursing)* （保健（医薬/歯学/看護を除く）, *Home Economics*（家政）, *Physical Science*（理学）, and *Engineering and Technical*（工学/工業）.

For most specialties with significant results, international students seem to choose their work country based on the demand in that particular country. Nevertheless, the result of the *Health (Medicine/Dentistry/Nursing)* （保健（医薬/歯学/看護））specialty is surprising. Graduates specializing in *Health (Medicine/Dentistry/Nursing)* （保健（医薬/歯学/看護））are found to be less likely to stay in Japan, despite the shortage of nursing workforce in the country. This is largely due to the high hurdle for foreigners to get employed in healthcare positions in Japan. In 2017, Japan introduced a work visa called Nursing Care (介護) which has gradually facilitated the employment of foreign nursing care employees in the country. Since this study only covers data from 2015 to 2017, it is reasonable that the likelihood of international students

specializing in *Health (Medicine/Dentistry/Nursing)*（保健（医薬/歯学/看護））staying in Japan remains low, especially when compared to those in the fields of *Humanities and Social Sciences* (人文社会科学). The underlying factors that affect this situation are worth further exploration in future research.

Model (2a) demonstrates that for students from countries more developed than Japan, results for all other specialties become insignificant (Table 5). Only the coefficient for *Arts*（芸術）is found to be positive and significant (Model (2b) in Table 5), while the results for students from countries less developed than Japan are consistent with that of full samples in Model (2) (Table 4).

4.5 Fund resource

The results also show that a government-funded international student is less likely to work in Japan upon graduation. In the 2015-2017 *SISCAD* surveys, the government fund refers specifically to the Japanese Government (Monbukagakusho: MEXT) Scholarship.

This outcome is counter-intuitive. Usually, students funded by their country of origin are inclined to go back to their home country, because they are typically obligated to return home upon graduation as per the terms of their contracts, generally for a pre-determined number of years. Otherwise, the recipients may be required to repay the funds received, along with potential penalties. These payments will increase the cost of the graduates who choose to stay abroad.

However, the Japanese Government Scholarship imposes no restrictions on

recipients regarding their choice of work country upon graduation. It is interesting to note that these recipients are still less likely to work in Japan compared to the self-fund students. This result proved that the Japanese Government Scholarship has helped increase human capital in the home countries of international students. It also implies that the target group of human capital Japan can retain mainly consists of self-funded international students.

4.6 Distance

A negative correlation has been found between the distance from an international student's home country to Japan and their likelihood of staying in Japan upon graduation (Table 4). Students from more remote countries are less likely to work in Japan, and more likely to return to their home countries. The higher transportation costs may increase the cost for them to visit their family and friends in their home country, thus making them reluctant to stay.

This negative relationship holds for students from countries less developed than Japan (Model (1a) and (2a) in Table 5). However, for those from countries more developed, the result for distance becomes positive and significant (Model (1b) and (2b) in Table 5). The farther the country, the more likely its international students are to stay in Japan. For students from wealthier countries, transportation costs may not be as significant, whereas larger cultural differences approximated by larger distances may attract them to stay. Nevertheless, this speculation needs further investigation in future studies.

It is also noteworthy that the square of the distance does not significantly affect the international students' choice of host country, indicating that the classical gravity model does not apply in this context.

5. Discussion and conclusions

Like many other developed countries, Japan is suffering from severe depopulation and aging population problems, and attracting international immigration is considered an effective solution to address these challenges. International students, in particular, serve as a valuable source of immigrants due to their youth, education, and high potential of acculturation to the receiving society.

Previous studies on international students have primarily focused on those who have graduated for various lengths of period, and the mechanisms behind their decisions regarding choice of country may be mixed. This study distinguishes it from more conventional literature on international students' choices of countries by focusing on students upon graduation. Utilizing the 2015-2017 *SISCAD* data and logit model, this study aims to answer the following question: What factors influence international students' decision to stay in Japan upon graduation? The main conclusions are as follows.

5.1 The intertwined decisions of education and migration

This study finds that international graduates with higher levels of human

capital or those who initially came to Japan for language education are more inclined to leave the country. Meanwhile, international students who found an effective way to be equipped with job-oriented human capital, are more likely to remain in Japan. International students may have pre-decided to work in Japan or not, and have chosen educational institutions accordingly. These findings align with the previous study of Dustmann and Glitz (2011), who argue that migration and education decisions are intertwined. Their optimal life cycle location model suggests that individuals who intend to remain in the host country after graduation and those who do not, differ in their strategy of how and where they pursue human capital investments over the life cycle.

The findings are also in line with the argument proposed by Li et al. (1996), who suggest that people tend to choose country, school, and specialty based on where they intend to work after graduation. According to them, migration destinations appear to be pre-determined, even before they make their choice of study country. Although we cannot conclude precisely when migration destinations are decided, this study demonstrates that international students do make comprehensive decisions regarding their study country, specialty, and work country after graduation.

5.2 A proposal for a culture-diversity model

Based on the results for the per capita GDP ratio, the choice of country by international students can be partly explained by the models proposed by Rosenzweig (2006). Rosenzweig (2006) suggests the migration model when the

return to education in their home country is low, international students go to acquire schooling in the host country as a means of entering and staying there. When the return to education in their home country is high, but the schooling is not good enough, he suggests the school-constraint model in which international students are more prone to return home. Rosenzweig's (2006) study was conducted in the United States, and his models overlooked international students from countries more developed than the host country. In the case of Japan, this study allows us to observe the effects on both sides.

Juxtaposing the results for the per capita GDP ratio and employment status, international students from countries less developed than Japan indeed fit into Rosenzweig's (2006) models. They generally are attracted to Japan by not only the education, but also by the economic opportunities and higher return to education in the labor market.

However, for students from countries with higher per capita GDP than Japan, their home countries' economic development levels seem not to affect their choice of country, but the employment opportunities in Japan will significantly increase their likelihood of staying. The significant and positive result for the specialty *Art* （芸術） indicates that these students appear to be attracted to Japan by the different culture instead of economic returns.

The work-country choice of international students can be explained Rosenzweig's (2006) models when they come from countries less developed than the host country, while we need other explanations for international

students from countries more developed. Those students' choice of countries will be difficult to predict from the difference in expected economic gains, but the difference in culture between the host and home country. Therefore, this study proposes a culture-diversity model to explain international students' choice of country, in addition to Rosenzweig's (2006) migration model and school-constraint model. This constitutes the core academic innovation of this study.

5.3 Policy implications

The findings of this study provide insights for Japan to implement effective strategies for attracting international students to work in the country.

First, the Japanese government can target individuals who are more likely to stay and can contribute to its workforce, to achieve effective policy results. Specifically, these individuals include self-funded international graduates, students from less developed countries, graduates from *Junior College*（短期大学） and *Vocational Schools (Specialized Courses)*（専修学校（専門課程））. Additionally, the policy target comprises graduates in specialties of *Arts*（芸術）, *Education*（教育）, and *Others* （その他）.

Second, the Japanese government should offer stronger incentives if they are less likely to work in Japan but are essential for the country (i.e. nursing workforce). However, Japan needs to be careful not to simply offer incentives to attract international students to stay. The host country must be cautious not to cause a detrimental 'brain drain' in the country of origin. Therefore, the

Japanese government should balance the need for retaining international graduates and mitigate the brain drain effect in the country of origin. The Japanese Government Scholarship programs should be continued, while measures to retain talents should be accompanied by expanding the entry of international students.

Third, Japan needs to take measures to assist more international students in finding jobs within the country. These measures include promoting information exchange between enterprises and students, offering educational programs to enhance students' understanding of Japanese working culture, providing longer visa durations for students to remain in Japan after graduation to search for employment, and so on.

5.4 Limitations and future research

This study is not without its limitations. First, it only discusses international students' choice of work country upon graduation. Their choices may evolve over time, which warrants further research. Second, this study only focuses on human capital acquired through education, whereas further study could explore human capital accumulated from work experience as well. Additionally, future studies could yield more fruitful results by incorporating personal attributes, such as gender, marital status, children, and schooling years in the host country.

Acknowledgments

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Endnotes:

[i] These rates were calculated based on surveys of self-funded international students. However, given that self-funded international students comprise the majority of all international students (96.1% in 2020) (MEXT, n.d.), their data can be considered representative of the entire international student group.

[ii] The data for this secondary analysis, " Survey on International Students' Career and Academic Degrees, 2015-2017, Japan Student Services Organization (JASSO)," was provided by the Social Science Japan Data Archive, Center for Social Research and Data Archives, Institute of Social Science, The University of Tokyo.

[iii] This retention rate is calculated without including international graduates who are going to pursue further education. Subsequent retention rate hereafter is calculated in the same manner.

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