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研究課題名(和文)女性研究者の初期キャリア問題：任期付職、出産時期、研究生産性に関する研究

研究課題名(英文) Early careers of female researcher - fixed term contract, timing of birth, and research productivity

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研究成果の概要(和文)：本研究は、大学教授労働市場における男女差について、それがどのようなメカニズムをもって起こるかに関しての実証研究を行った。データ収集は、合計4800名の研究者に質問表を郵送する形で行なった。我々の推定によると、研究生産性やその他様々な観察できる要因をコントロールしたあとでも、6%の男女賃金差が残る。他の労働市場で普通観察される「Motherhood wage penalty」は本データでは観察できなかった。また、英国の教授労働市場では、男女間のOutside offerの差が教授職の男女賃金差に影響を与えるという結果が出ているが、日本ではそのような結果は観察されなかった。

研究成果の概要(英文)：To understand these differences, economists must examine a complex array of potentially significant factors, such as institutional context, productivity differences, child-bearing and home production, and bargaining behavior. Many of these factors are not well captured by standard census data. I use a new survey of academics in Japan to better understand the sources of gender pay and promotion differences. I find a 6% pay gap which persists when we control for research productivity, despite an institutional context shaped by explicit salary tables. I similarly find an early-career promotion gap when we control for productivity; however, late-career promotion differences are well-explained by our productivity measures. Mothers and childless women earn similar salary, although this may be the result of positive selectivity into early motherhood that conceals the motherhood wage penalty. Gender salary gaps are not affected by differences in outside job offers.

研究分野：Labor Economics

キーワード：Gender salary gap Gender promotion gap Academic labor market Relative income Job related stress Motherhood wage penalty Outside job offer Academia

## 1. 研究開始当初の背景

There has been substantial improvement in pay equity between men and women in many countries over the past three decades or so. However, stubborn and persistent pay differences remain in the face of human capital and other control variables. One challenge in understanding the persistence of the gender gap is that the differences in labor market behavior between men and women are incompletely captured by standard data sources. Experience and education are very rough measures of skill when men and women differ substantially in continuity of labor market participation or in field of study. Potential gender differences in bargaining behavior will not be reflected in our usual data sources. Differential engagement in child-rearing and home production may be hard to properly adjust for. Relevant institutional forces may not be easily identified in data sources that are meant to reflect the overall economy.

In part for these reasons, social scientists have increasingly turned to more detailed surveys, often for particular occupations and labor markets, in order to better identify some of the subtle forces affecting the gender pay gap.

An early example is Wood et al. (1993), who survey male and female law school graduates from the University of Michigan in order to track the evolution of gender differences among this particular population. Rich controls for child-bearing, hours worked, and type of legal practice leave a 13 % pay gap between male and female graduates of the same law school 15 years after graduation.

Similarly, Bertrand et al. (2010) track the early-career evolution of men and women earning MBAs from the University of Chicago Booth School. They find nearly equal pay for new graduates but a growing gender pay gap over time. This increasing gap is well explained by differences in career interruptions and hours worked, typically connected to family formation.

## 2. 研究の目的

The goal of this project is to contribute to this literature by using original survey

data of Japanese academics to study pay differentials in the academic labor market in Japan. Japan has been noted for its large gender pay gap in the general labor market. However, rigorous quantitative research on the gender salary gap in the Japanese labor market is still scarce, and there is much still to learn about the sources of the gender gap.

## 3. 研究の方法

### 3.1 Data

Data were obtained from a survey I administered via a postal questionnaire in 2011. First, I obtained an official list of all four-year universities in Japan from the Ministry of Education, Culture, Sports, Science and Technology (MEXT)'s web page (86 national, 95 public and 599 private universities). Second, by checking each university's web page, we collected the names of all faculty in STEM departments: 29,114 names (17,567 from national, 1,487 from prefectural, and 10,060 from private universities). I targeted full-time faculty only, and therefore did not send surveys to post-docs.

I sent 4800 questionnaires. In order to increase the number of women, I first selected all the female-sounding names (1,122 names). Then, I randomly selected the rest of the names (3,678). I sent questionnaires to each faculty member's work address and sent a reminder two weeks later. I received 1,636 responses for a response rate of 34%.

### 3.2 Estimation model

I estimate log annual salary regressions with female dummy and other control variables that are likely to affect salary. Some variables are typical of any salary regressions, though we control for the following variables that of particular importance for my study.

Quantity of research output is measured by the total number of peer-reviewed articles without distinguishing between single-authored and co-authored articles. Quality of research output is measured by the variable *Field top 20 article share*. Respondents were asked to provide the names of the journals in which their top three articles were published. Field top 20 article share indicates the share of field top

20 articles among the three reported articles.

If female academics are over-represented in low-paying universities, the female dummy will pick up the difference in university characteristics. To minimize this possibility, we control for several university characteristics. Universities differ in many dimensions, such as reputation, research orientation, location, and public or private status. To control for reputation, the ideal variable would be the departmental ranking. Due to the anonymous nature of our survey, this is not possible. However, reputation is likely to be correlated with research orientation, a characteristic we are able to control for. Respondents were asked to indicate the weights that their departments place on research, teaching and administrative duties in promotion decisions. I use the weights on research to control for research orientation. I also controlled for research orientation by including a dummy for PhD-granting institutions.

Salary can be affected by various allowances. For example, public universities provide 'cost of living adjustment allowances' to cover for the higher costs of living in bigger cities. Private universities do not have explicit cost of living adjustment allowances, but their salaries could reflect the cost of living. Thus, we include five large city dummies, Class 1 Cities to Class 5 Cities, based on NPA's university location classifications, to adjust for nominal salary differences that are connected to cost of living.

Our survey respondents were asked to tick their location.} Japanese universities also pay an allowance for those who have a dependent spouse. This allowance is paid when the spouse's annual income is less than 1.3 million yen for public universities, and less than 1.03 million yen for private universities. Our regressions include a dummy for those who are eligible for dependent spouse allowance.

Job mobility variables are created as follows. Each respondent reports the entire history of job moves and the reasons for each move: for a salary increase; for a better job environment; due to contract expiration; for family reasons; or for 'other reasons'. In case of 'other reasons', we asked them to write down the actual

reasons. The most common 'other reasons' were to obtain promotion, and because they were offered a job. Multiple answers were allowed. Thus, we reclassified the moves into five categories. A type 1 move is any move that entails a salary increase. A type 2 move is any move that is due to other positive reasons, and that do not entail a salary increase, namely for a better job environment, for promotion, or because they are offered a job. A type 3 move is a move that is the result of contract expiration, and that does not entail any positive reasons. A type 4 move is a job move that is purely a result of family reasons. A type 5 is a job move that cannot be classified in any of the first four types. Our regressions control for the total number of each type of moves.

#### 4. 研究成果

I use a standard Mincer earnings function to examine gender salary differences. Simplest model that does not control for rank and research productivity shows 8.3% gender salary gap. When rank variables are controlled for, the gender salary gap drops to 6.3%. When we separately estimate the gender salary gap for (i) private universities, and for (ii) public and national universities, the gender gap estimates are almost equal, at 6.5%. The most comprehensive model includes our research productive variables, and is shown in this report. As can be seen, the gender salary gap is 6%, and is statistically significant.

Dependent variable =	Log (salary)
Female	-0.060*** (0.011)
Full professor	0.270*** (0.019)
Associate professor	0.159*** (0.016)
Assistant professor (Excluded rank=lecturer)	0.075*** (0.022)
#Career articles/100	0.060*** (0.017)
(#Career articles/100) <sup>2</sup>	-0.013*** (0.005)
Field top 20 article share	0.016

	(0.011)		(0.003)
Annual grant amount/1000	-0.001	Eligible for spousal allowance	-0.018**
	(0.002)		(0.009)
Initial rank=Full professor	0.100***	Class 1 cities	0.093***
	(0.031)		(0.014)
Academic experience	0.018***	Class 2 cities	0.077***
	(0.002)		(0.015)
Academic experience <sup>2</sup>	-0.000***	Class 3 cities	0.085***
	(0.000)		(0.011)
Non-academic experience	0.005***	Class 4 cities	0.074***
	(0.001)		(0.011)
Married	0.038***	Class 5 cities	0.035***
	(0.011)		(0.011)
Fixed termn position	-0.049***	Civil Engineering	-0.017
	(0.013)		(0.014)
Have a managerial position	0.041***	Environmental engineering	0.004
	(0.012)		(0.019)
Private university	0.149***	Mathematics	-0.017
	(0.011)		(0.021)
Department offers PhD	0.042***	Physical Science	0.001
	(0.015)		(0.019)
Have PhD from Japan	0.025	Mechanical Engineering	-0.008
	(0.016)		(0.011)
Have PhD from abroad	0.001	Chemical science	-0.019
(Excluded=MA and below)	(0.025)		(0.015)
Weight on research	0.001***	Biological Science	0.020
for promotion (¥%)	(0.000)		(0.019)
Teach graduate courses	0.012	Material/Applied chemical	-0.012
	(0.013)	engineering	(0.011)
#MA supervisees	0.003***	Other science (Astronomy,	0.013
	(0.001)	Material, earth and	(0.018)
#PhD supervisees	0.005**	planetary)	
	(0.002)	Other fields	0.053
			(0.042)
#Subjects taught per year=0	-0.031**	Constant	6.075***
	(0.014)		(0.031)
#Subjects taught per year=4-6	0.014	Observations	1,409
	(0.009)	R-squared	0.805
#Subjects taught per year>7	-0.008		
(Excluded=#Subjects=1-3)	(0.017)		
#Sessions taught per week	0.001		

## 5. 主な発表論文等

(研究代表者、研究分担者及び連携研究者には下線)

[雑誌論文] (計 4 件)

### Refereed articles

Takahashi, Ana Maria; Shingo Takahashi; and Thomas Maloney (2018) “Gender gaps in STEM in Japanese academia: The impact of research productivity, outside offers, and home life on pay, forthcoming, *Social Science Journal*, <https://doi.org/10.1016/j.sosci.2018.02.013>

Takahashi, Ana Maria; and Shingo Takahashi (2016) “Job Stress in Japanese Academia: The Role of Relative Income, Time Allocation by Task and Children”, *Journal of Asian Economics*, 2016, 43, pp.12-17

Takahashi, Ana Maria; and Shingo Takahashi (2015), “Gender Promotion Differences in Economics Departments in Japan: A Duration Analysis”, *Journal of Asian Economics*, 2015, 41, pp.1-19

### Working Papers

Takahashi, Ana Maria; Shingo Takahashi; and Thomas Maloney (2015) “Gender Salary and Promotion Differences in Japanese Academia: Results from Science and Engineering”, Discussion Paper 1522, Graduate School of Economics, Kobe University, 2015

[学会発表] (計 5 件)

2016, Oct. Invited Talk, Workshop “Womenomics, Japan and EU”, Kobe University

2016, Aug. Finance and Economics Conference, Lupcon Center, Frankfurt “Gender Gaps in STEM in Japanese Academia: The Impact of Research Productivity, Outside Offers, and Home Life on Pay”

2016, Jan. Western Economic Association Pacific Rim Conference, Singapore (also served as a discussant) “Gender Gaps in STEM in Japanese Academia: The Impact of Research Productivity, Outside Offers, and Home Life on Pay”

2015, June Western Economic Association Annual Meeting, Hawaii, US (also served as a discussant) “Gender Gaps in STEM in Japanese Academia: The Impact of Research Productivity, Outside Offers, and Home Life on Pay”

2015, Jan. Western Economic Association Pacific Rim Conference, Wellington, New Zealand (also served as a discussant) “Gender Gaps in STEM in Japanese Academia: The Impact of Research Productivity, Outside Offers, and Home Life on Pay”

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ホームページ等

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