The Motherhood Wage Penalty[*]

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Abstract

The study investigates the relationship between motherhood and mothers' wages. Most Japanese women quit their jobs after childbirth; therefore, the gender pay gap in Japan is larger than in other developed countries. Although the relationship between motherhood and mothers' wages has been sufficiently investigated in the United States and Europe to resolve the gender pay gap issue, it has been neglected in Japan. After childbirth, mothers experience the following: (1) decline or disturbance of accumulation of human capital, (2) reduced work effort, (3) trading of higher wage jobs for mother-friendly jobs, or (4) discrimination in the labor market. Among Japanese women aged 20−44 years, a wage penalty for mother was approximately 5% per child. Thus, the relationship between motherhood and wages is not linear and monotonic; women with three or more children experience higher wage penalties. Furthermore, the most important factor for motherhood penalty is long-term unemployment.

Keywords: Motherhood penalty, Human capital, Gender pay gap, Employer discrimination

1. Introduction

Japan is a society in which there is high gender inequality. According to *The Global Gender Gap Report 2017* (World Economic Forum 2017), Japan is listed 114th out of 144 countries ranked by the Global Gender Gap score. The gaps between women and men regarding economic participation and political empowerment are factors that especially contribute to Japan's low ranking. For example, about 47% of Japanese women leave their place of employment after giving childbirth (National Institution of Population and Social Security Research 2016). In addition, the gender pay gap in Japan is at 25.9% (OECD 2017), which is larger than in other developed countries. However, the gender pay gap also exists in the United States and Europe, where women tend to continue participating in the labor market. As measured in 2014, females in the United States and the United Kingdom earn about 17% less than males

(OECD 2017). The OECD reported that women experience a steep increase in the gender wage gap during childbearing and childrearing years, which indicates the presence of the so-called "motherhood penalty" (OECD 2012: 169). The same report revealed that women who work full-time and have children earn significantly less than men when compared to childless women. To close the gender pay gap, the relationship between motherhood and mothers' wages has been thoroughly investigated in both the United States and Europe, but remains unexamined in Japan. The purpose of this study is to determine whether the motherhood penalty exists in Japan, and, if so, to examine its causes.

2. Theoretical framework

2.1 Explanation of the motherhood penalty

The motherhood penalty has been a frequently analyzed topic mainly in the United States (Waldfogel 1997; Budig & England 2001; Gangl & Ziefle 2009; Budig & Hodges 2010; Budig et al. 2012; England et al. 2016). Scholars have explored the extent to which women's wages are lowered by having children (i.e., the "gross" motherhood penalty), as well as the reason motherhood results in lowered wages (i.e., the "net" motherhood penalty). In the United States, women experience an average wage penalty of 7% per child (Budig & England 2001). The factors leading to this penalty remain empirically unexplained. However, empirical research has discovered that family structure and resources, job characteristics, human capital, unobserved individual characteristics, and employer discrimination are all circumstances that affect wages.

Family structure and resources

The family structure includes marital status, the age of the mother at first childbirth, and the ages of children in the family. Marriage can increase the family resources of women through the earnings of a husband, and allows women to reduce their work efforts while caring for children. This suggests that women who marry higher-income men are more likely to reduce their work efforts while prolonging unemployment, which increases the motherhood penalty. In other words, the family characteristics include both family structure and resources, which are indicators of the sexual division of labor in the family unit.

Job characteristics

Women often work part-time to reconcile the responsibilities of work and family life. Childcare costs and time constraints often make part-time work an attractive option for mothers who wish to resolve this conflict, even if it means such wages are lower than those offered by full-time employment opportunities. However, part-time work rarely offers a transition to full-time employment, and many mothers continue to work part-time on a long-term basis. Contrary to the theory positing a trade-off between high earnings and employment flexibility, it is thought that there is a family-friendly employment link to high earnings. Large firms and public-sector entities oftentimes offer high or above-average salaries while providing more family-friendly benefits (e.g., generous maternity and paternity leave, childcare assistance, family allowance, flexible schedules, and reduced working hours) compared to those of smaller firms.

Human capital

Women with no (or few) children may have higher amounts of human capital because they have greater opportunities to be active in the labor market compared to women with children (especially those who have many). There is both firm-specific and general human capital; a variety of work experiences are used to measure human capital, including general employment experience, full and part-time experience, and company seniority. Budig & England (2001: 206) refer to the number of employment breaks when discussing this concept, asserting in their study that "continuity may influence wages – that is, among women with equal years of experience, those with more continuous experience may have higher earnings."

Unobserved individual characteristics

Some of the same individual characteristics that are exogenous to both earnings and fertility may account for the motherhood penalty. However, these characteristics are not observed in the data. If such unobserved heterogeneity exists, the correlation between earnings and the presence of children is not causal. For example, women who care less about their careers may not hesitate to have children while taking a career break, which leads to lower wages. Previous studies have discussed unmeasured heterogeneity (e.g., career aspirations) by using fixed-effects models. Personal fixed-effects models require panel data that measure variables

during at least two points in time. However, if cross-sectional data is used, then the results may include unchanging and unmeasured heterogeneities.

Employer discrimination against mothers

Penalties unexplained by the abovementioned mechanisms (and that persist in fixed-effects models) suggest the existence of an additional mechanism; that is, employer discrimination against mothers. It is difficult to ascertain discrimination by examining survey data. However, both experimental and audit studies show evidence to support employer discrimination against mothers regarding callbacks for job applications, hiring decisions, wage offers, and promotions (Benard & Correll 2010; Correll et al. 2007).

2.2 Empirical Research Involving the Motherhood Penalty in Japan

With the exception of two studies by Kawaguchi (2005; 2008), there has been almost no research involving the motherhood penalty in Japan. Kawaguchi's studies focused on the Japanese Panel Survey of Consumers (JPSC), but involved longer panel data in 2008 than in 2005. Kawaguchi (2008) analyzed data from women aged 24-44 by using the JPSC 1993-2003; this analysis found an approximately 24% gross motherhood penalty using OLS, and around a 5% penalty using fixed-effects. Kawaguchi's (2008) research concluded that the main factor of the motherhood penalty involved career breaks resulting from childbearing. This is because the majority of the penalty can be explained by workplace seniority and the total years of employment. Our analyses are inferior to Kawaguchi's (2008) in terms of controlling for unobserved heterogeneity. However, our analyses have two advantages. That is, we distinguish between work and unemployment experience in the same manner as Budig & England (2001), and also clarify the relative importance of each factor of the motherhood penalty mechanism in Japan.

3. Method

3.1 Data and variables

In this study, we used data from the 2015 Social Stratification and Social Mobility (2015SSM) survey. Data samples involved women who earned wages by working as company employees. Women who were managers or had obtained executive positions,

were self-employed, had family employment, or were enrolled in school were excluded. Japanese women tend to withdraw from the labor market after childbearing, but return during middle age. Thus, the wage penalty may differ depending on whether a mother is in her childrearing years. In order to account for this difference, we prepared two subsamples. One included women aged 20-59 (sample A), and the other included women aged 20-44 (sample B). Sample B was used to analyze the wage gap between childless women and mothers of a younger age group, who tend to face choices of childbearing (and childrearing) and pregnancy. Out of a total of 4,249 women involved in this study's data, 1,189 were categorized into sample A, while 703 were categorized into sample B.

This study's dependent variable was the natural log of hourly wages involved in each respondent's current job. We omitted women whose hourly wages appeared to be data outliers (i.e., those with wages below 100 yen or above 20,000 yen per hour). There were three principal independent variables (i.e., child variables). In our sample A analysis, the total number of children under 18 years of age or younger was the main independent variable. In alternate specifications, we measured children with dummy variables for one child, two children, and three or more children (with "no children" as the reference category). The number of children by age (divided into categories of "3 years of age or younger," "4-6 years of age," and "7-18 years of age") was the independent variable during our analysis of sample B. Dividing by age group, we considered the difference of the motherhood penalty according to the age of children. Family characteristic variables were used as dummy variables for marital status (i.e., "married," "divorced or widowed," (with "never married" as the reference category), and husband's annual income). These variables represented family structure and resources.

Measures of human capital included seniority in the present workplace, total years of regular employment experience, non-regular employment experience, and unemployment experience. Job characteristics included a dummy variable coded as 1 if the respondent's current job involved non-regular employment, and dummy variables for firm sizes of "30-299 people," "300 people and above," and "work in the public sector" (with "1-29 people" as the reference category).

The control variables were age, squared age, and years of education. Our analyses considered years of education as a control because this variable rarely changes for women after childbearing in Japan.

3.2 Models

We used ordinary-least-squares (OLS) regression models to analyze the 2015SSM data. Data from the 2015SSM were cross-sectional. Thus, we could not eliminate bias created by the failure to include controls for unmeasured heterogeneity that had additive effects. The results of our analysis may therefore leave the effects of the unchanging aspects of cognitive aptitude, preferences resulting from early socialization, life cycle plans, tastes for affluence, future orientation, and other unmeasured human capital. Employer discrimination was also not controlled for in this study. The models capturing the "gross" motherhood penalty included no controls other than the child and control variables. Models controlling for family characteristics, job characteristics, and human capital showed the "net" motherhood penalty. We determined the mechanism of the motherhood penalty based on the net effect of child variables by controlling for factors, other than the child variable, that were related to the motherhood penalty.

4 Results

4.1 The Gross Motherhood Penalty and its Mechanism

Table 1 presents means for the variables used in the analysis by motherhood status. Models intended to capture the causal effects begin in Table 2. The gross motherhood penalty is about 5%. Adding the family characteristic variables to the gross model slightly decreases the estimated motherhood penalty. The coefficients of marital status show the married penalty. By examining the average effects of marriage across child statuses, married women earn about 14% less than women who were never married; that is, most women experience wage-loss before becoming mothers. Table 2 shows that job characteristics are clearly part of the explanation of the motherhood penalty. The net motherhood penalty (controlling for the family and job characteristic variables shown in Table 1) is about 3%, and the statistical significance of the child variable weakens. The average effects of non-regular employment across child statuses (which decrease women's wages by about 45%) indicates that the wages of mothers become lower due to changes in employment status after childbearing. Although the effects of the child variable in the human capital model do not differ greatly from the job characteristics model, its coefficient is smaller than both the gross and family characteristics models. Losing human capital reduces the child

penalty from about 5% to 3%.

Table 1. The means for the variables used in the analysis by motherhood status

| | Women aged 20-59 (N=1189) | | Women aged 20-44 (N=703) | |
	Childless (N=671)	Mother (N=518)	Childless (N=322)	Mother (N=381)
Hourly wage	7.097	7.010	7.097	6.993
	(0.521)	(0.586)	(0.468)	(0.593)
Ln hourly wage	1391.108	1306.910	1347.235	1284.962
	(860.326)	(790.845)	(676.631)	(766.702)
Children Variables				
Total number of children		1.838		1.958
		(0.760)		(0.773)
Number of children (dummy)				
One child		0.361		0.294
		(0.481)		(0.456)
Two children		0.461		0.480
		(0.499)		(0.500)
Three or more children		0.178		0.226
		(0.383)		(0.419)
Number of children by age				
3 years old or younger		0.191		0.257
		(0.486)		(0.550)
4-6 years old		0.276		0.357
		(0.504)		(0.546)
7-18 years old		1.280		1.220
		(0.900)		(0.978)
Age	42.227	39.977	30.758	37.139
	(12.416)	(6.561)	(7.155)	(5.052)
Education (in years)	13.326	13.129	13.839	13.113
	(1.889)	(1.803)	(2.004)	(1.815)
Family Characteristics				
Marital status				
Never married	0.465	0.056	0.798	0.060
	(0.499)	(0.230)	(0.402)	(0.238)
Married	0.455	0.819	0.174	0.824
	(0.498)	(0.386)	(0.380)	(0.381)
Divorced/widowed	0.080	0.125	0.028	0.115
	(0.272)	(0.332)	(0.165)	(0.320)
Husband's annual income	214.0835	409.073	78.494	385.663
(in million)	(291.521)	(318.069)	(189.632)	(261.208)
Job Characteristics				
Non-regular employment	0.441	0.521	0.342	0.507
	(0.497)	(0.500)	(0.475)	(0.501)
Firm size				
1-29 people	0.277	0.301	0.276	0.315
	(0.448)	(0.459)	(0.448)	(0.465)
30-299 people	0.325	0.268	0.292	0.255
	(0.469)	(0.444)	(0.455)	(0.436)
300 people and above	0.282	0.307	0.314	0.318
	(0.450)	(0.462)	(0.465)	(0.466)
Public sector	0.116	0.124	0.118	0.113
	(0.321)	(0.329)	(0.323)	(0.317)
Human Capital				
Seniority in the present workplace	6.991	6.351	4.078	5.480
(in years)	(7.482)	(6.661)	(4.840)	(5.645)
Total years of regular employment	10.809	9.807	6.640	8.491
(in years)	(10.564)	(8.628)	(6.665)	(7.444)
Total years of non-regular employment	6.782	5.378	3.075	4.845
(in years)	(8.232)	(5.618)	(4.980)	(5.166)
Total years of unemployment	3.434	3.753	0.242	2.882
(in years)	(5.671)	(4.671)	(1.037)	(3.777)

Table 2. The average motherhood penalties per child

	Gross	+ Family characteristics	+ Job characteristics	+ Human capital
Total number of children	-0.052 **	-0.042 *	-0.030 †	-0.031 †
	(0.017)	(0.020)	(0.017)	(0.017)
Age	0.043 ***	0.041 **	0.030 **	0.025 *
	(0.012)	(0.012)	(0.011)	(0.011)
Age²	0.000 **	0.000 **	0.000 **	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Education (in years)	0.086 ***	0.083 ***	0.054 ***	0.051 ***
	(0.008)	(0.009)	(0.008)	(0.008)
Marital status (ref; never married)				
Married		-0.142 *	-0.072	-0.084
		(0.063)	(0.057)	(0.055)
Divorced/widowed		0.021	0.032	0.037
		(0.061)	(0.056)	(0.054)
Husband's annual income (in million)		0.000 †	0.000 *	0.000 **
		(0.000)	(0.000)	(0.000)
Non-regular employment			-0.456 ***	-0.318 ***
			(0.029)	(0.038)
Firm size (ref; 1-29 people)				
30-299 people			0.057 †	0.060 †
			(0.035)	(0.035)
300 people and above			0.171 ***	0.173 ***
			(0.034)	(0.034)
Public sector			0.226 ***	0.193 ***
			(0.053)	(0.053)
Seniority in the present workplace (in years)				0.007 **
				(0.002)
Total years of regular employment (in years)				0.000
				(0.005)
Total years of non-regular employment (in years)				-0.009 †
				(0.005)
Total years of unemployment (in years)				-0.011 *
				(0.005)
Intercept	5.047 ***	5.127 ***	5.766 ***	5.816 ***
	(0.241)	(0.244)	(0.217)	(0.218)
N		1189		
R²	0.100	0.107	0.303	0.328

Note: Women aged 20-59. OLS models. Numbers in parentheses are robust standard errors. $^†p < .10$, $^*p < .05$, $^{**}p < .01$, $^{***}p < .001$.

Table 3 shows measurements regarding the presence of children with three dummy variables, with each being relative to the reference category of no children. We determined whether measuring "motherhood" with a continuous variable counting the total number of children obscured nonlinear or non-monotonic relationships. Table 3 shows that the gross penalty is about 12% for one child, 13% for two children, and 20% for three or more children. There is large gap between having one or two children and three or more children; there is an additional 7% for having three or more children. Controlling for the family characteristics and all job characteristic variables, the penalties are 8% for one child and 10% for two children, but the penalty for three or more children becomes statistically insignificant. As with the

models using the number of children as a continuous variable, the addition of job variables reduces the penalty.

Table 3. Determining whether the relationships between motherhood and wages are linear or monotonic

Control variables in models	One child	Two children	Three or more children
Gross	-0.121 **	-0.130 **	-0.201 *
	(0.040)	(0.049)	(0.097)
+ Family characteristics	-0.106 **	-0.117 **	-0.186 †
	(0.042)	(0.051)	(0.098)
+ Job characteristics	-0.080 **	-0.097 **	-0.152
	(0.038)	(0.044)	(0.095)
+ Human capital	-0.059	-0.067	-0.114
	(0.038)	(0.044)	(0.100)
N		1189	

Note: Women aged 20-59. OLS models. Numbers in parentheses are robust standard errors.
†$p < .10$, *$p < .05$, **$p < .01$, ***$p < .001$.

Moreover, looking at the human capital model, all penalties lose statistical significance and decrease to about half (from 12% to 6%, 13% to 7%, and 20% to 11% for each child status). These results imply that the loss of human capital during unemployment or working non-regularly is an important factor of the motherhood penalty mechanism. In addition, women with three or more children experience a greater penalty because they are more likely to take long employment breaks, making it difficult to return to the labor market as regular workers.

We analyzed the mechanism of the motherhood penalty in more detail by focusing on variables that could change after childbearing (i.e., non-regular employment, firm size, seniority in the present workplace, total years of regular employment, total years of non-regular employment, and total years of unemployment). Table 4 shows a comparison of the magnitude of each variable in the changes of the child penalty by setting the family characteristics model (see tables 2 and 3) as a baseline model. The values in table 4 are gaps between the coefficient of the child variable in the family characteristics model and the one in each model. For example, when the coefficient of the total number of children is -0.031 in the model that added the non-regular employment variable to the family characteristics model, the magnitude is (-0.03) - (-0.04) = 0.01 (this is the value at the top of the left column). The results show that non-regular employment, regular employment

experience, and unemployment experience are key factors of the motherhood penalty. Regardless of the type of the child variable, the total years of unemployment especially reduce the child penalties and reduce their statistical significance.

Table 4. Comparison of the magnitude of each variable
in the changes of the child penalty

	Gross, family characteristics + non-regular employment	Gross, family characteristics + firm size	Gross, family characteristics + seniority in the present workplace
Total number of children	0.01 (†)	0.00 (**)	0.00 (*)
One child	0.03 (*)	0.00 (**)	0.01 (*)
Two children	0.01 (*)	-0.00 (**)	0.00 (*)
Three or more children	0.02	-0.07 (*)	0.02 (†)

	Gross, family characteristics + total years of regular employment	Gross, family characteristics + total years of non-regular employment	Gross, family characteristics + total years of unemployment
Total number of children	0.01 (†)	-0.01 (*)	0.02
One child	0.07	-0.01 (**)	0.08
Two children	0.08	0.00 (*)	0.09
Three or more children	0.12	0.00 (†)	0.11

Note: Women aged 20-59(N=1189). Marks in parentheses are the statistical significance of each children variable in the each model.
$^{†} p < .10,$ $^{*} p < .05,$ $^{**} p < .01,$ $^{***} p < .001.$

4.2 The wage penalty for mothers in the younger age group

Here, we examine whether motherhood penalties differ according to the age of children. Table 5 presents a nearly 7% gross motherhood penalty for children between 7-18 years of age, but not for other age groups. This result may reflect a situation of mother employment in Japan in which there is a selection for working mothers with children of 3 years of age or younger. Most mothers with children of 3 years of age or younger do not participate in the labor market. Thus, only mothers who earn high wages remain in the labor market. The gross motherhood penalty for having children aged 7-18 years is explained by job characteristics and human capital. The net motherhood penalty by controlling for the job characteristic variables is about 3%, and not statistically significant.

Table 5. Average motherhood penalties according to the age of children

	Gross	+ Family characteristics	+ Job characteristics	+ Human capital
Number of children by age				
3 years old or younger	0.012	0.019	-0.052	-0.071
	(0.059)	(0.060)	(0.057)	(0.057)
4-6 years old	-0.072	-0.069	-0.016	-0.015
	(0.054)	(0.055)	(0.049)	(0.050)
7-18 years old	-0.072 **	-0.075 **	-0.034	0.005
	(0.027)	(0.029)	(0.024)	(0.026)
Age	0.085 **	0.092 **	0.101 ***	0.100 **
	(0.031)	(0.031)	(0.028)	(0.027)
Age^2	-0.001 *	-0.001 **	-0.001 **	-0.001 **
	(0.000)	(0.000)	(0.000)	(0.000)
Education (in years)	0.072 ***	0.068 ***	0.042 ***	0.031
	(0.010)	(0.011)	(0.010)	(0.012)
Marital status (ref; never married)				
Married		-0.134	-0.104	-0.124
		(0.090)	(0.082)	(0.082)
Divorced/widowed		0.025	0.019	0.033
		(0.083)	(0.070)	(0.068)
Husband's annual income		0.000	0.000 †	0.000 †
(in million)		(0.000)	(0.000)	(0.000)
Non-regular employment			-0.458 ***	-0.305 ***
			(0.037)	(0.052)
Firm size (ref; 1-29 people)				
30-299 people			0.067	0.078 †
			(0.046)	(0.045)
300 people and above			0.205 ***	0.207 ***
			(0.044)	(0.044)
Public sector			0.203 **	0.185 **
			(0.069)	(0.068)
Seniority in the present workplace				0.005
(in years)				(0.004)
Total years of regular employment				-0.011
(in years)				(0.009)
Total years of non-regular employment				-0.025 **
(in years)				(0.009)
Total years of unemployment				-0.046 ***
(in years)				(0.012)
Intercept	4.560 ***	4.523 ***	4.800 ***	4.840 ***
	(0.508)	(0.511)	(0.446)	(0.439)
N		703		
R^2	0.107	0.107	0.314	0.353

Note: Women aged 20-44. OLS models. Numbers in parentheses are robust standard errors. $^†p < .10$, $^*p < .05$, $^{**}p < .01$, $^{***}p < .001$.

5. Conclusion

We found a motherhood wage penalty of approximately 5% per child among Japanese women. The relationship between motherhood and wage is not linear or monotonic; women with three or more children experienced a greater wage penalty. The most important factor behind the mechanism of the motherhood penalty is long-term unemployment. This result suggests that preventing human capital from decreasing is

important for easing motherhood penalties. It is also possible that employer discrimination, which prolongs the unemployment of mothers, is the most significant mechanism of the motherhood penalty. The result of the wage penalty for mothers among the younger age group infers a sample selection bias. To clarify the motherhood penalty in Japan, not only verification with various data, but dealing with selection is also necessary.

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