How does temporary flexibility influence gender wage gap : Evidence from Japanese Education and Learning Support Industry

時間的柔軟な働き方から見た賃金の男女間格差（ジェンダーギャップ）

―事例研究：日本の教育・学習支援業―

Nagoya University

Graduate School of Economics

Master course: Luo Xiwen

luoxiwen2016@yahoo.co.jp

Mentor: Prof. Xue Jinjun

Background and Literature Review

- Although the researches focus on gender wage gap has continued for a few decades, this area is still innovative.
- Under a traditional division of labor by gender in the family, women will anticipate shorter and more discontinuous work lives as a consequence of their family responsibilities.(Blau and Kahn, 2017)

Background and Literature Review

- Employee demand for temporal flexibility has been proved that it has a positive connection with the gender wage gap.(Goldin, 2011)
- Occupations where it finds it difficult to provide temporal flexibility usually with the more significant gender wage gap. e.g.business and finance, while professions in tech and science are with higher temporary flexibility and less gender wage gap. (Goldin, 2014)

An exception: Education and Learning Support Industry in Japan

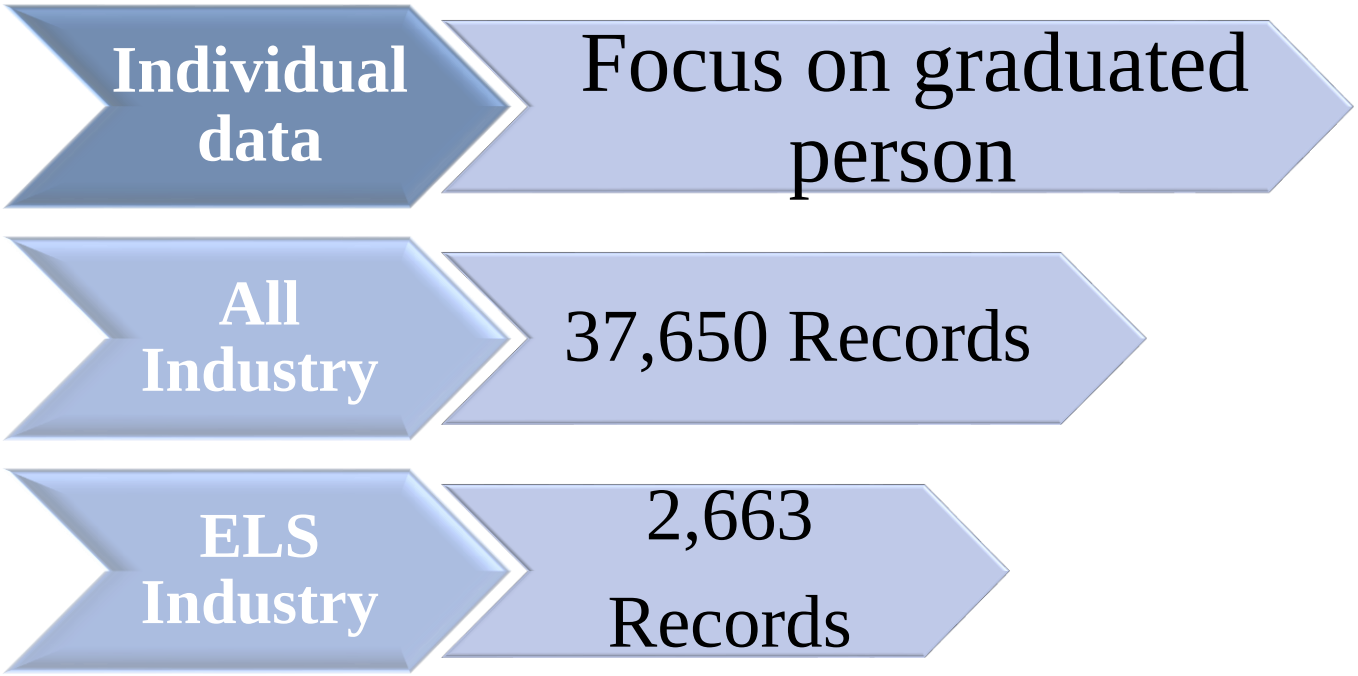
- Industry with more women employee tend to have a higher demand for temporal flexibility and the broader gender wage gap (Goldin, 2011).
- Education and Learning Support industry could be regard as a different case.

Research Purpose

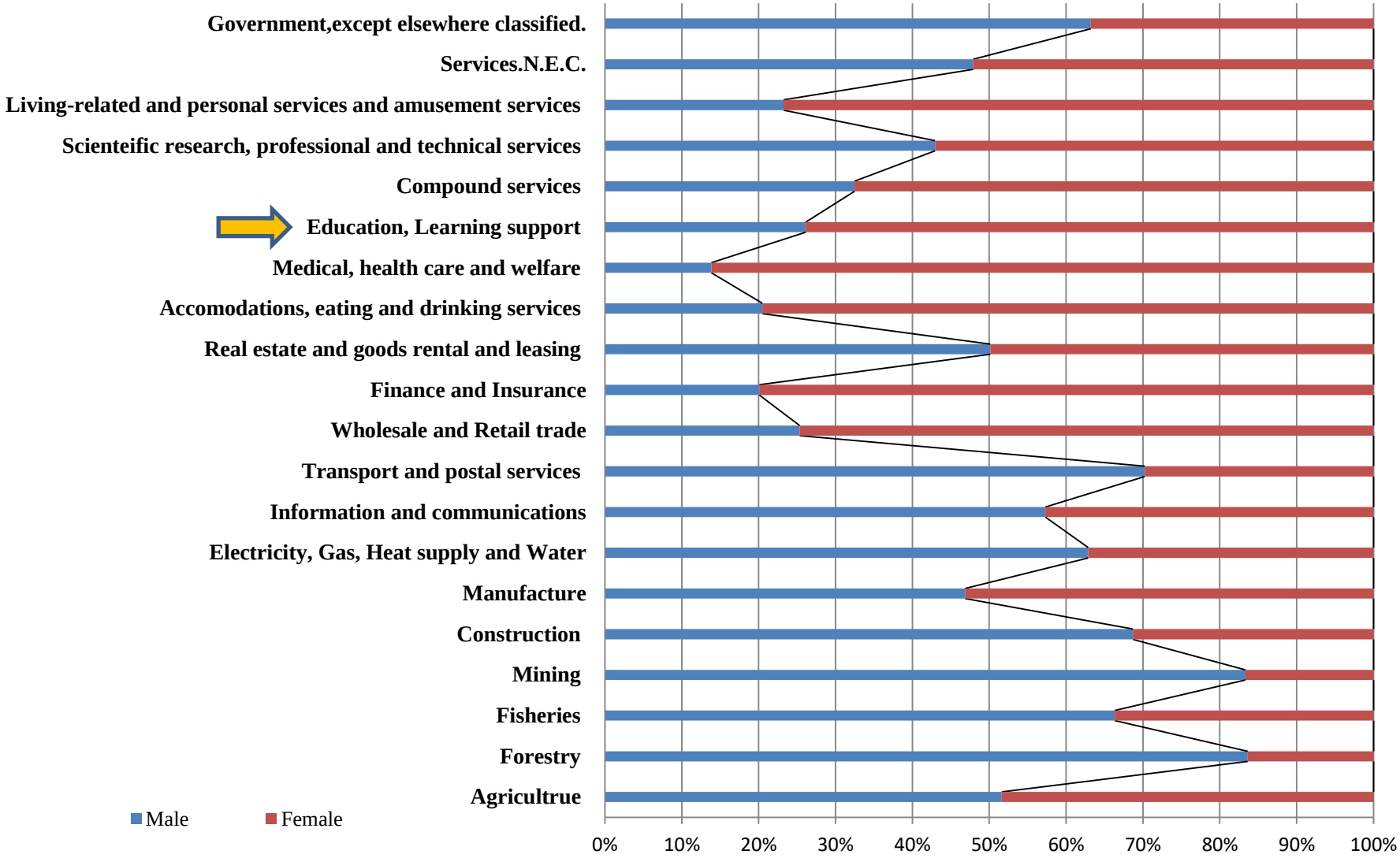
- How does the temporal flexibility of work influences gender wage gap in Japan Education and Learning Support Industry(ELS)
- The factors that influence the income scale in Japan Education and Learning Support Industry

Data

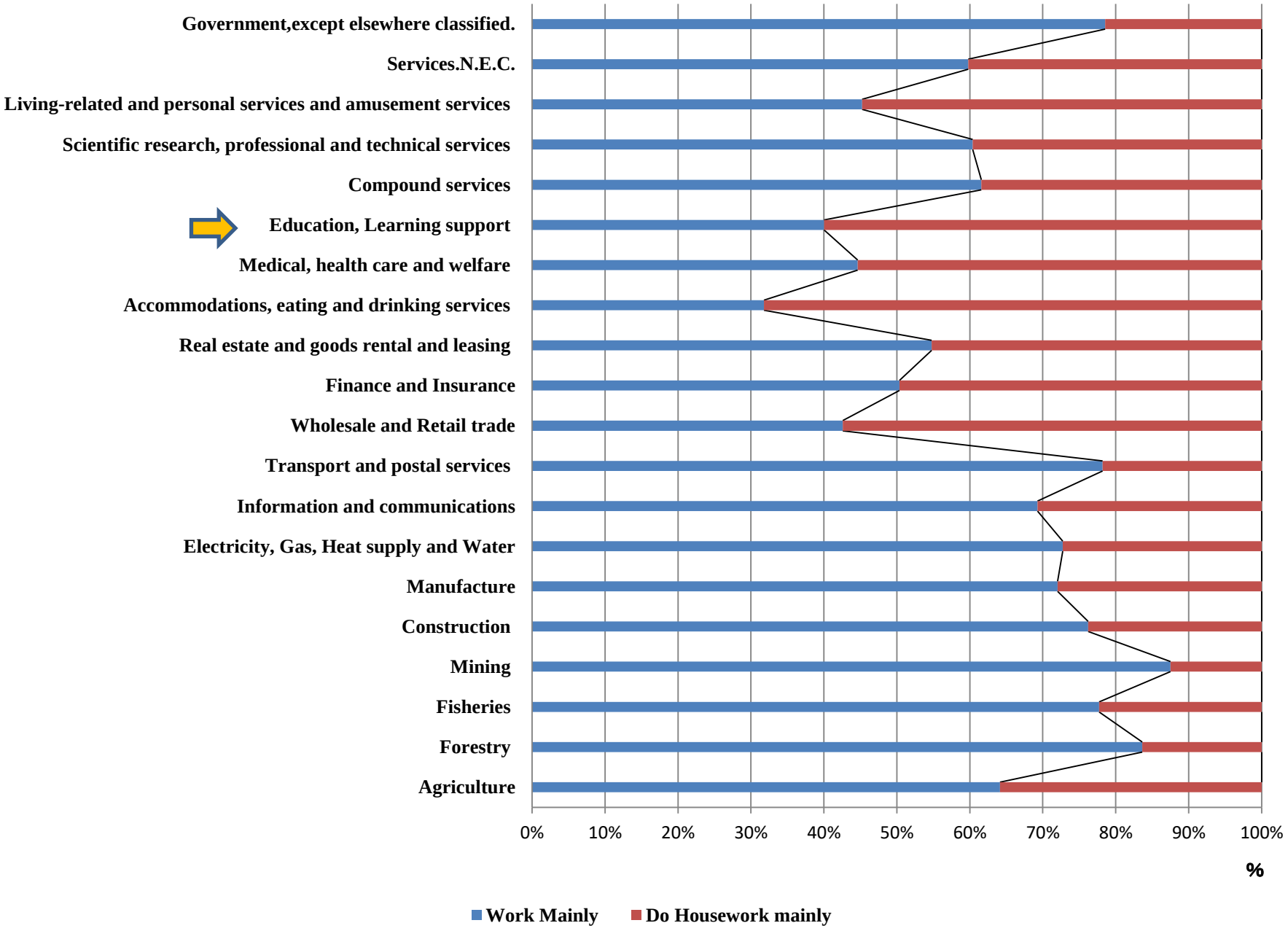
- Anonymous data from Employment Status Survey (2007)



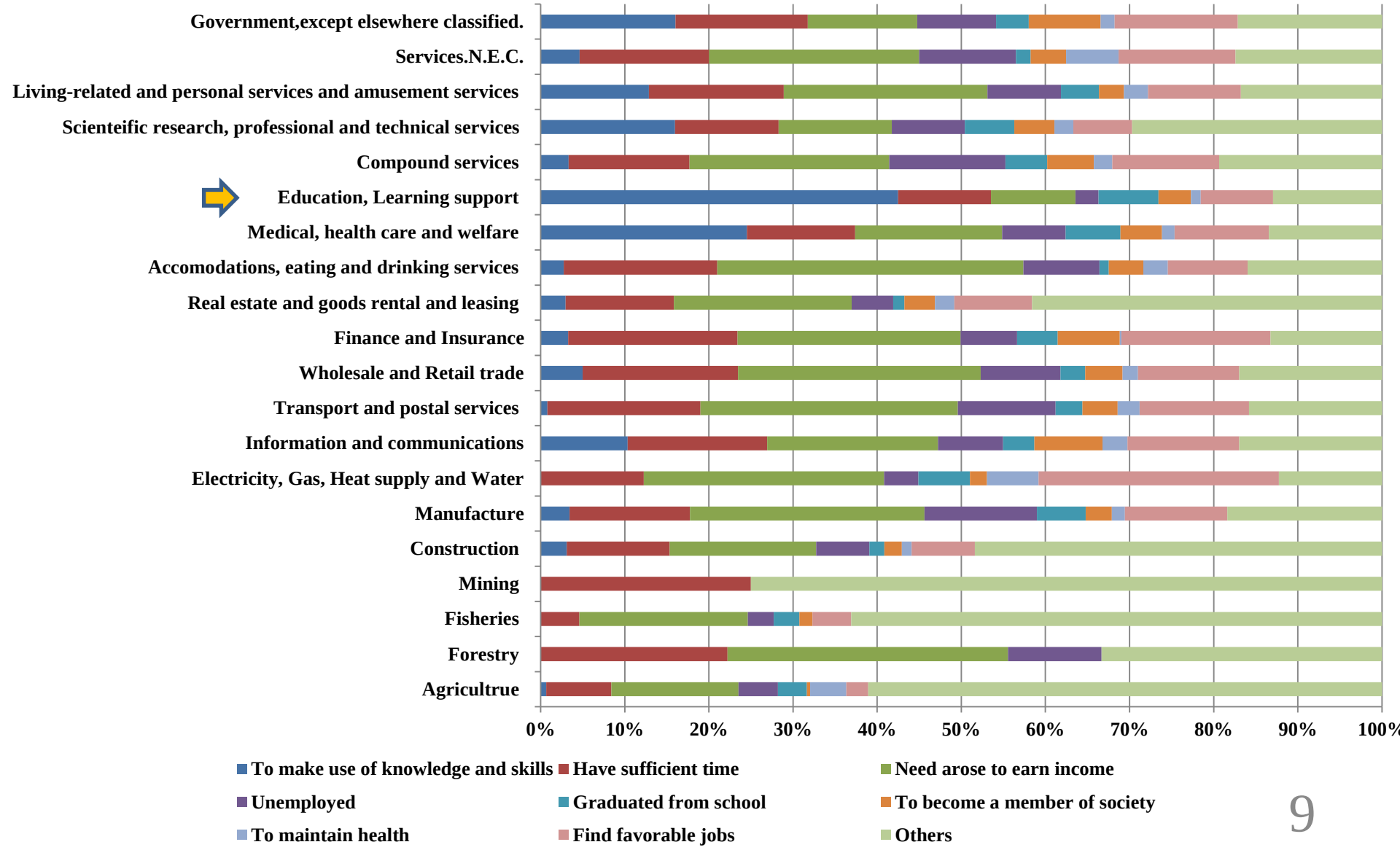
The percentage of employees by gender (in broad category)



Main priority of work by industry

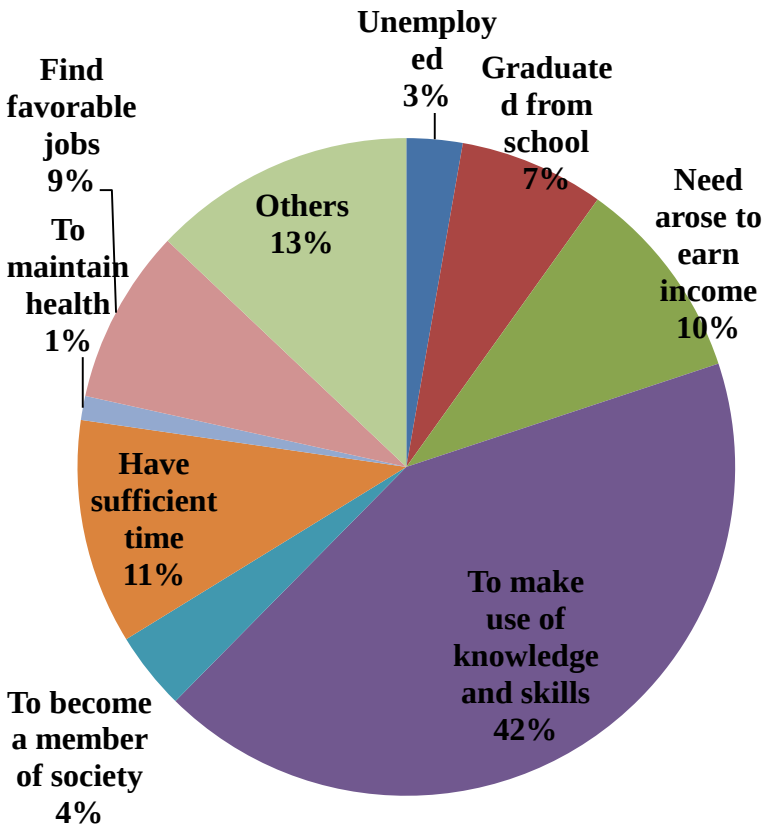


The reason for employment by industry

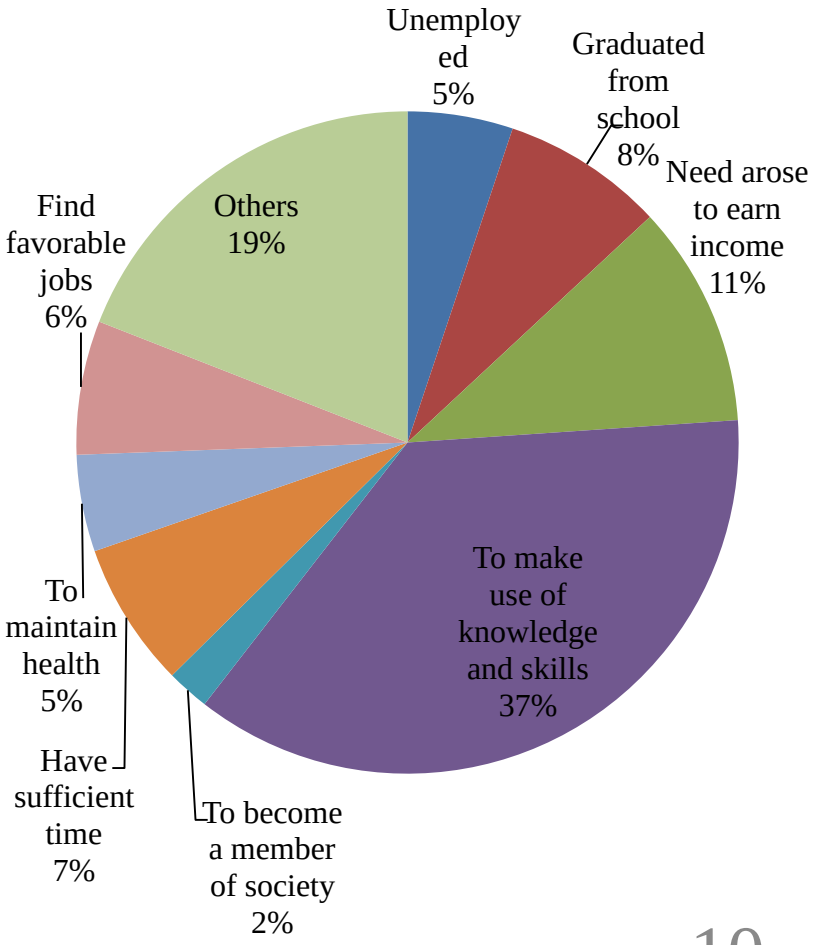


The reason for employment in ELS

Female



Male



Analysis of Factor Variables

- Regard Male and ELS industry as baseline group
- From the interaction of female and industry:

Compared with ELS, only in three industries women have more chance to get higher income, but consider the ratio of gender in these industries, ELS may be considered as a **women-friendly industry** in Japan.

	Female*Industry coefficient	Std.
Agriculture	0.555***	0.135
Forestry	0.109	0.813
Fisheries	-1.350***	0.351
Mining	-1.746	1.217
Construction	-0.676***	0.141
Manufacture	-1.560***	0.113
Electricity, Gas, Heat supply and Water	-2.423***	0.410
Information and communications	-1.685***	0.410
Transport and postal services	-0.926***	0.152
Wholesale and Retail trade	-0.660***	0.114
Finance and Insurance	-2.390***	0.226
Real estate and goods rental and leasing	-0.127	0.204
Accommodations, eating and drinking services	0.638***	0.144
Medical, health care and welfare	-0.0663	0.135
Education and Learning Support		
Compound services	-0.959***	0.304
Scientific research, professional and technical services	-0.969***	0.203
Living-related and personal services and amusement services	0.575***	0.159
Services.N.E.C.	-0.0685	0.124
Government,except elsewhere classified.	-2.703***	0.175
constant	4.006***	0.0826
Observations	37,695	
R-squared	0.273	

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Methodology

- To figure out to what extent temporal flexibility influences gender wage gap and which factors influence income scale in ELS industry.
- Characteristic of the data: Categorical (nominal or ordinal)
- e.g. Income scale of it are coded from 1 to 15 which 1 represents less than 500,000 yen per year, and 15 represents more than 15,000,000 yen per year.

Methodology

- Traditional methodology: OLS
- Method used in this study:
  1. Interval Regression (IR)
  2. Ordered Probit Model (OPM)

	Log likelihood
Interval Regression	-4288.983
Ordered probit Model	-3657.4045 (Fit better)

Ordered Probit Model

An index model for a single latent variable y_i^*

$$y_i^* = \boldsymbol{x_i'}\beta + u_{\boldsymbol{i}}$$

For $y_i = j$

If $a_{j-1} \leq y_i^*$

$$\begin{aligned} p_{ij} &= p(y_i = j) \\ &= p\left(a_{j-1} \leq y_i^* \leq a_j\right) \\ &= F(a_j - \boldsymbol{x_i'}\beta) - F(a_{j-1} - \boldsymbol{x_i'}\beta) \end{aligned}$$

Where $\boldsymbol{x'}$ is a vector of control variables , F is the standard normal cdf

VARIABLES	(1) income	(2) income	(3) income
gender	-0.437***	-0.0185	-0.227***
	(0.0546)	(0.0582)	(0.0600)
marriage	-0.0239	0.0165	0.0739
	(0.0463)	(0.0501)	(0.0514)
age	-0.196***	-0.00834	-0.0610
	(0.0581)	(0.0605)	(0.0619)
c.age#c.age	0.0203***	-0.00424	0.00269
	(0.00759)	(0.00793)	(0.00810)
schooling	0.126***	0.127***	0.184***
	(0.0158)	(0.0165)	(0.0171)
mainpriority		-1.405***	-0.931***
		(0.0524)	(0.0568)
employmentstatus		-0.0649***	-0.0766***
		(0.0118)	(0.0121)
scale		0.0830***	0.0530***
		(0.00565)	(0.00591)
experience		0.0685***	0.0705***
		(0.00616)	(0.00636)
timedesire		0.0335	-0.0494
		(0.0351)	(0.0360)
change		-0.0599	-0.0157
		(0.0459)	(0.0470)
workingdaysperyear			0.388***
			(0.0253)
workinghoursperweek			0.206***
			(0.0120)

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Marginal Effect

- The marginal effect of an increase in a regression $\mathbf{x_r}$ on the probability of selecting alternative j is
- $\frac{\partial p_{ij}}{\partial x_{ri}} = \{F'(a_{j-1} - \boldsymbol{x_i'}\beta) - F'(a_j - \boldsymbol{x_i'}\beta)\}\beta_r$

Marginal Effects of Gender in ELS

Income (JPY)	Mfx of gender	Significance
no income or less than 500,000	0.0668	P<0.01
500,000~990,000	0.0124	P<0.05
1,000,000~1,490,000	-0.0382	P<0.01
1,500,000~1,990,000	-0.0181	P<0.01
2,000,000~2,490,000	-0.0109	P<0.01
2,500,000~2,990,000	-0.0040	P<0.01
3,000,000~3,990,000	-0.0036	P<0.01
4,000,000~4,990,000	-0.0021	P<0.01
5,000,000~5,990,000	-0.0012	P<0.01
6,000,000~6,990,000	-0.0005	P<0.01
7,000,000~7,990,000（11	-0.0002	P<0.05
8,000,000~8,990,000	-0.00008	P<0.05
9,000,000~9,990,000	-0.00002	P<0.10
10,000,000~14,990,000	-0.00007	P<0.05
more than 15,000,000	0	0

Marginal Effects of temporary flexibility relevant variables

Income (JPY)	Mfx of working days per year	Significance
no income or less than 500,000	0.1140	P<0.01
500,000~990,000	0.0211	P<0.01
1,000,000~1,490,000	0.0652	P<0.01
1,500,000~1,990,000	0.0309	P<0.01
2,000,000~2,490,000	0.0187	P<0.01
2,500,000~2,990,000	0.0068	P<0.01
3,000,000~3,990,000	0.0061	P<0.01
4,000,000~4,990,000	0.0035	P<0.01
5,000,000~5,990,000	0.0020	P<0.01
6,000,000~6,990,000	0.0009	P<0.01
7,000,000~7,990,000	0.0004	P<0.01
8,000,000~8,990,000	0.0001	P<0.01
9,000,000~9,990,000	0.00004	P<0.05
10,000,000~14,990,000	0.00011	P<0.01
more than 15,000,000	0	0

Marginal Effects of temporary flexibility relevant variables

Income (JPY)	Mfx of working hours per week	Significance
no income or less than 500,000	-0.0660	P<0.01
500,000~990,000	-0.0112	P<0.01
1,000,000~1,490,000	0.0350	P<0.01
1,500,000~1,990,000	0.0164	P<0.01
2,000,000~2,490,000	0.0164	P<0.01
2,500,000~2,990,000	0.0036	P<0.01
3,000,000~3,990,000	0.0032	P<0.01
4,000,000~4,990,000	0.0032	P<0.01
5,000,000~5,990,000	0.0018	P<0.01
6,000,000~6,990,000	0.0010	P<0.01
7,000,000~7,990,000	0.0004	P<0.01
8,000,000~8,990,000	0.0002	P<0.01
9,000,000~9,990,000	0.00002	P<0.05
10,000,000~14,990,000	0.00006	P<0.01
more than 15,000,000	0	0

Mainly Conclusions

- Compared with their male counterparts, female in ELS industry still have lower chance to reach higher income , but situations could be improved after control the temporal flexibility relevant variables.
- Marital status and age are not significant, while part-time job penalty is still obvious in ELS.

Mainly Conclusions

- Women are likely to get relative higher income when the income scale was less than 990,000 JPY per year.
- After that, although male have more probability to reach for higher income, this premium declines gradually.

Mainly Conclusions

- Each unit increases in the working hours per week could influences the different income scale differently, which is most obvious in the income scale of 1,000,000~1,490,000 JPY per year.
- Each unit increases in working week per year shows greater impact in relative lower income.

Future Work

- To compare the marginal effects of temporary flexibility relevant variables in different industries.
- Try to figure out the factors which influence the gender gap and income scale in other industries.