

Time Allocations, Social Norms, and Gender Gaps

Kazuharu Yanagimoto
December 16, 2022

Japan ranks 120th in 2021 gender gap report, worst among G-7



KYODO NEWS - Mar 31, 2021 - 15:03 | Feature, All, Japan

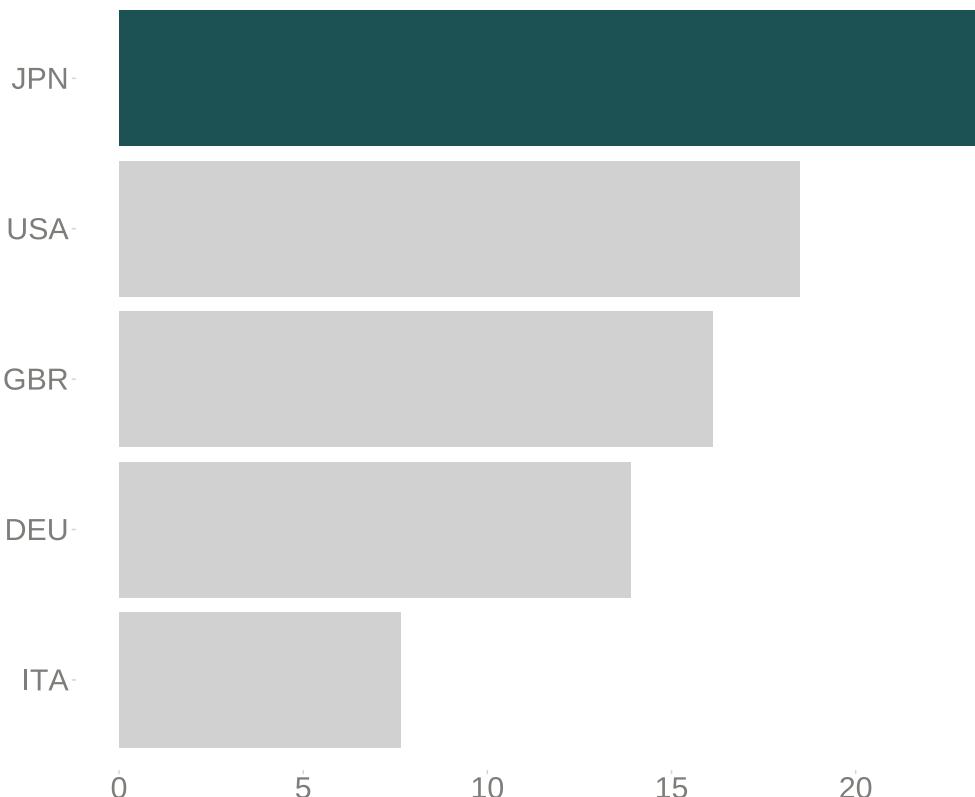


GENEVA – Japan ranked 120th among 156 countries in the gender gap rankings in 2021, remaining in last place among major advanced economies, a Swiss-based think tank said Wednesday.

Japan inched up one place from 121st in 2019, when the ranking was based on 153 countries, but stood far behind Italy, the next worst-ranked member of the Group of Seven industrialized countries, in 63rd place. The World Economic Forum said the level of women's participation in the political and economic arenas remains low in Japan.

Female Workers in Japan

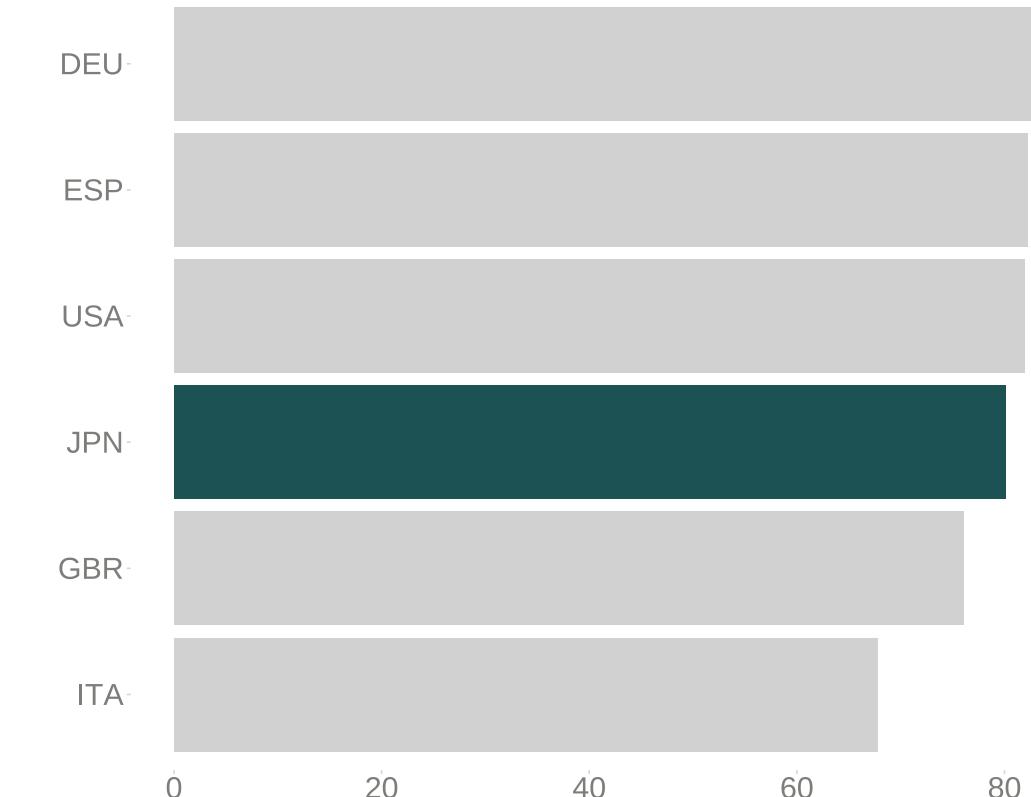
Gap in Median Earnings of Full-time
Workers in 2019



Fraction of Part-time in Female
Workers in 2019



Female Laborforce Participation in
2019



- Large gap in earnings and high ratio of part-time jobs
- Female participation is not low

Why is the gender wage gap large in Japan?
Why is the fraction of part-time workers large for
women in Japan?

What Do I Do?

Document Female Employment in Japan

- Large gender diff. in participation, occupations, working hours, and wage
- Regular vs Non-regular job
- Social norms on gender roles

Build a model

Choices on occupations and working hours

- Household members can choose not to work
- Occupations differ in the way hours map into earnings (linear vs. convex)

Utility cost associated to *social norms*

- Wives earnings more than husbands

Model explains

- All gender gaps in participation
- 33% in occupational choices, 74% in labor hours, and 34% in wage

Facts

Data

Japan Panel Study of Employment Dynamics (JPSED)

- 57,284 men and women older than 15 in Japan
- Panel data 2015-2019
- Earnings, working hours, housework, labor contracts (main earner and spouse)
- Use samples aged 25-59

Survey on Dual-Income Couples' Household Economy and Attitudes

- 2200 couples, aged 35-49 (30-55) for females (males), in the Greater Tokyo Area
- One-year survey in 2014
- Earnings, working hours, housework, types of contracts

Regular and Non-regular Jobs

In Japanese statistics, a definition is used: Regular and Non-regular Jobs

- Based on “how their occupations are classified in the company”
- There is no precise definition

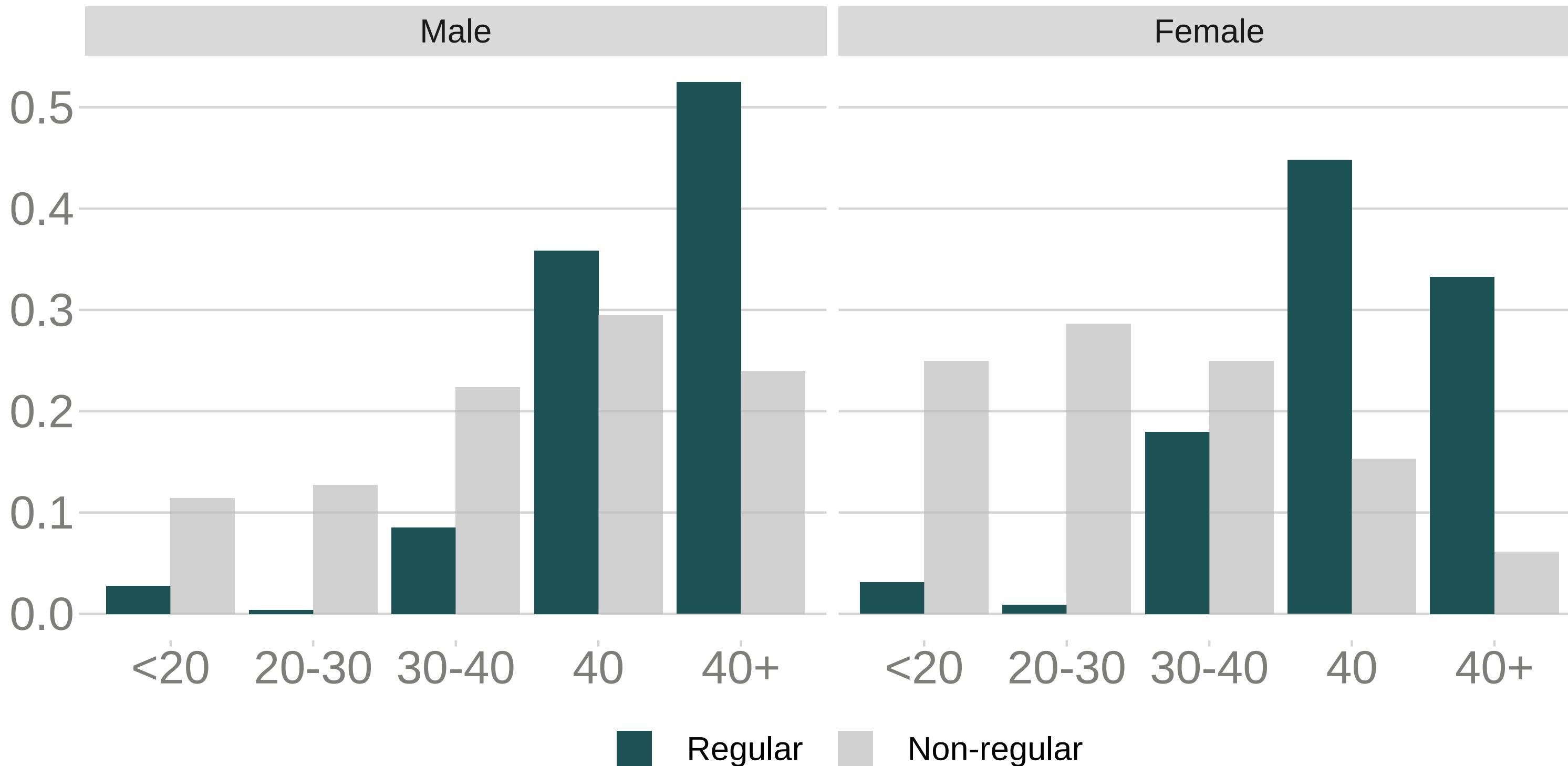
However, they are *typically*

	Regular	Non-Regular
Contract	Permanent	Temporary
Hours (week)	40/40+	Lower and Dispersed
Wage	High	Low

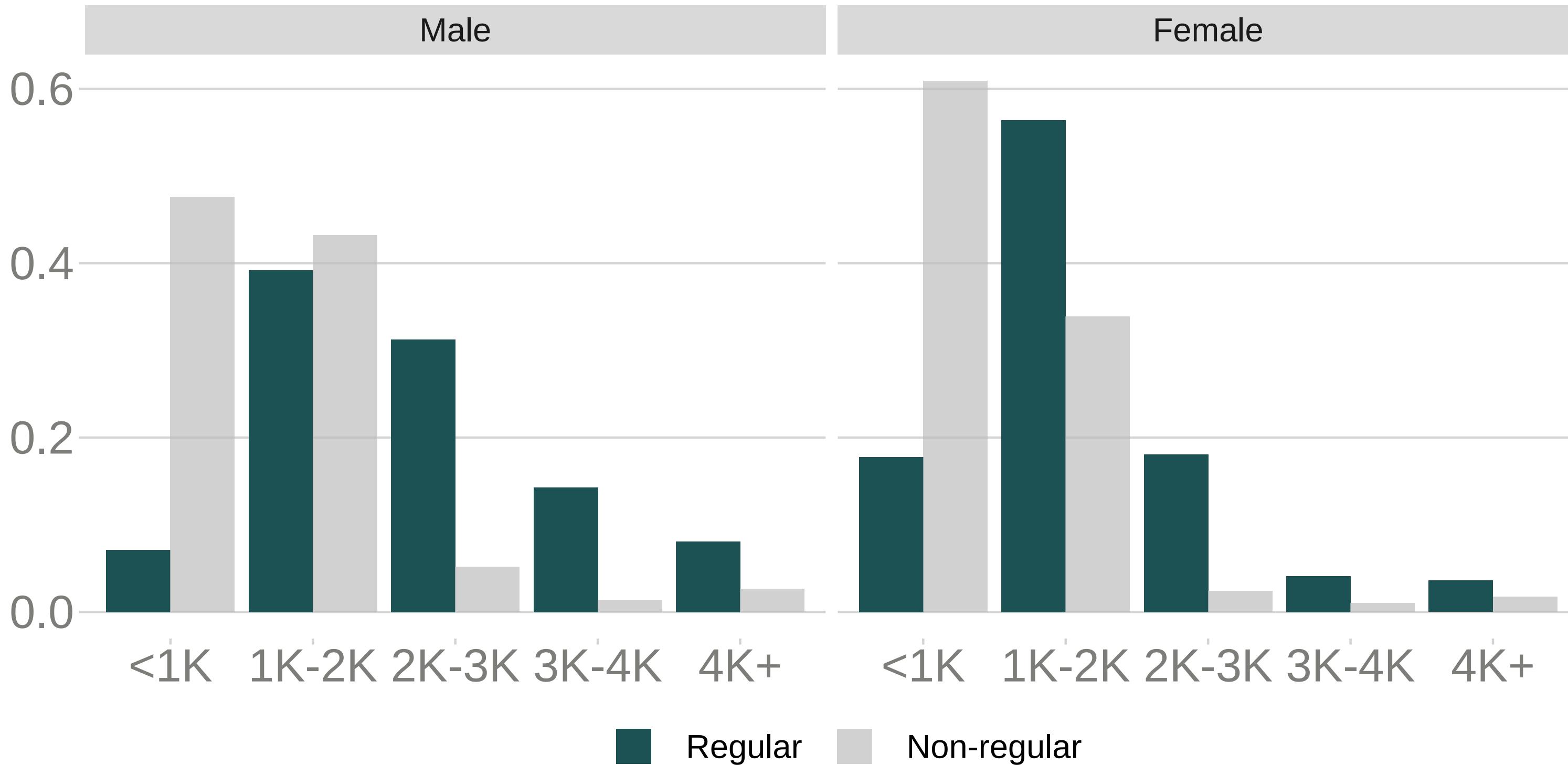
In JPSED,

- 92 % (91 %) of male (female) regular workers have permanent contracts
- 13 % (14 %) of male (female) non-regular workers have permanent contracts

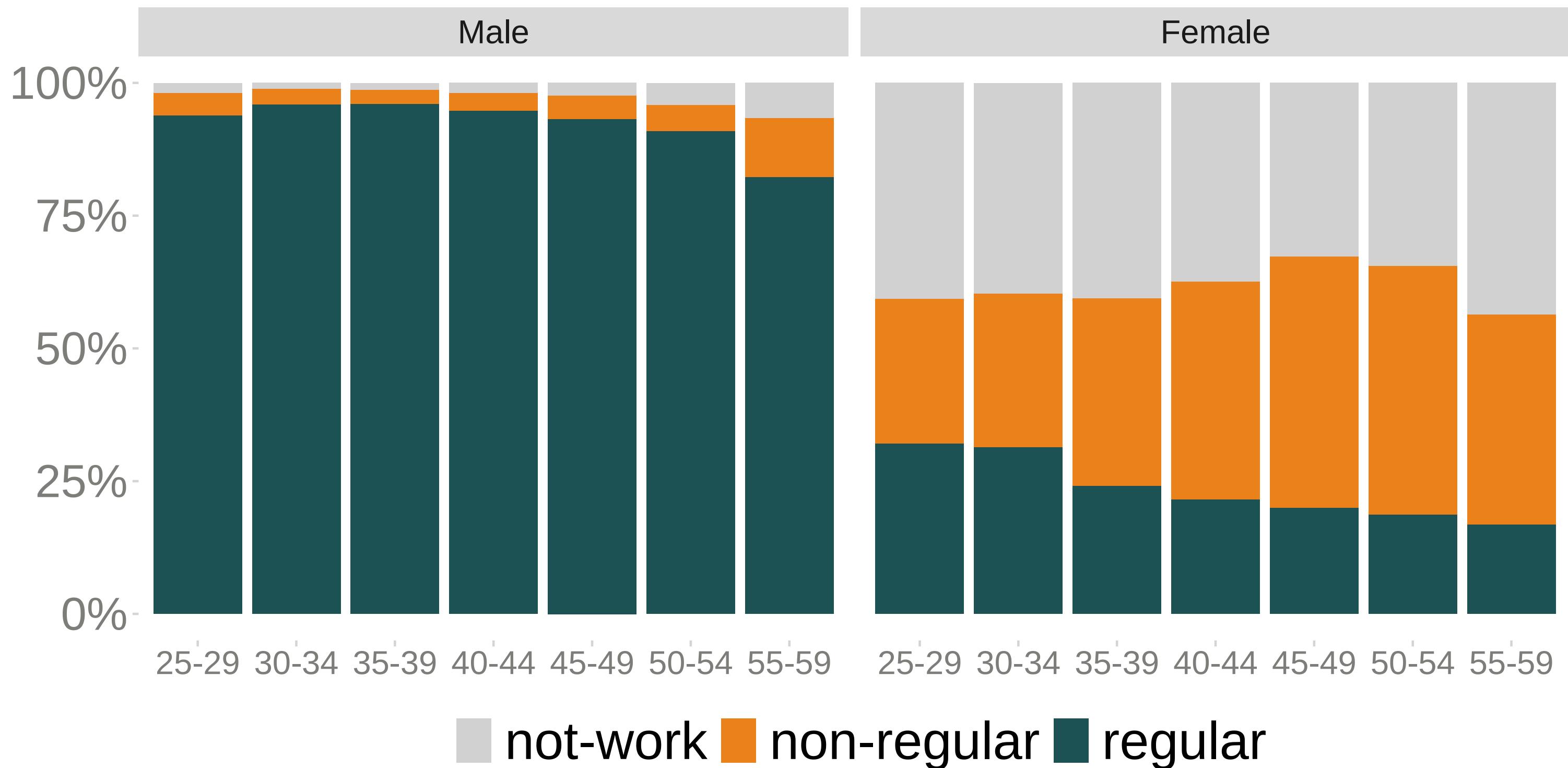
Distribution of Weekly Working Hours



Distribution of Hourly Wage ($1\text{K JPY} \approx 6.9 \text{ EUR}$)

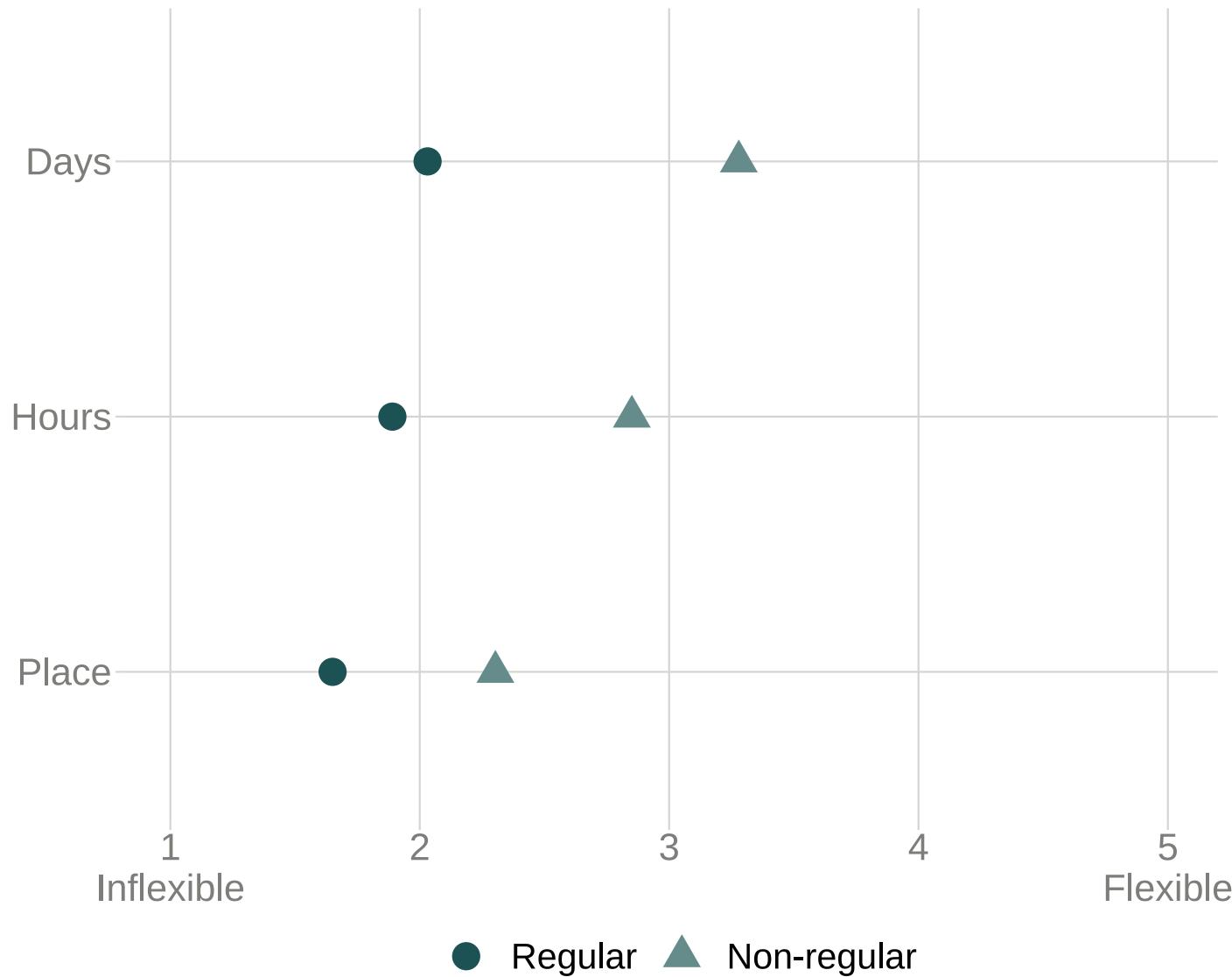


Occupational Choices of Married Men and Women

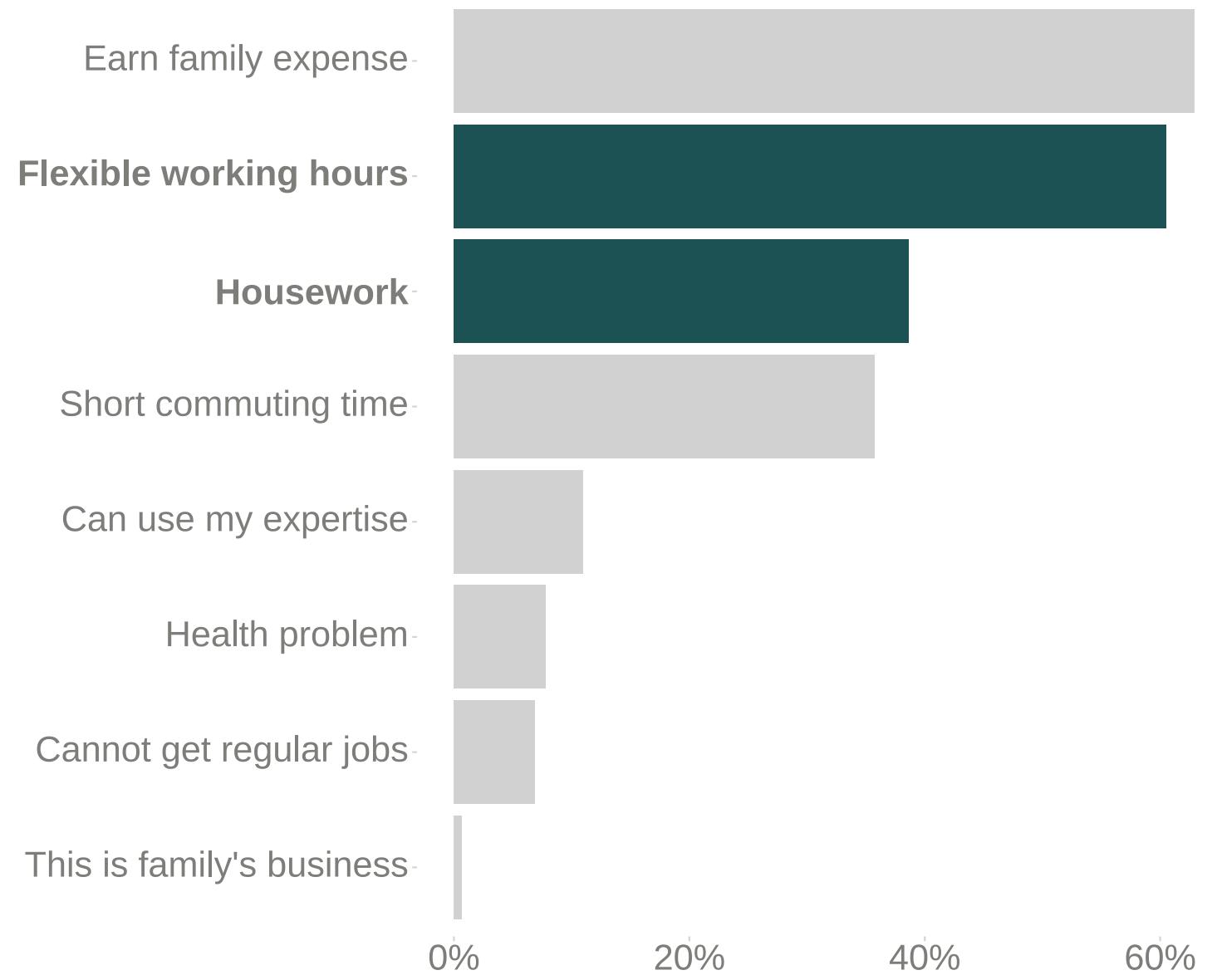


Why Do Women Choose Non-regular Jobs?

Flexibility of the Job



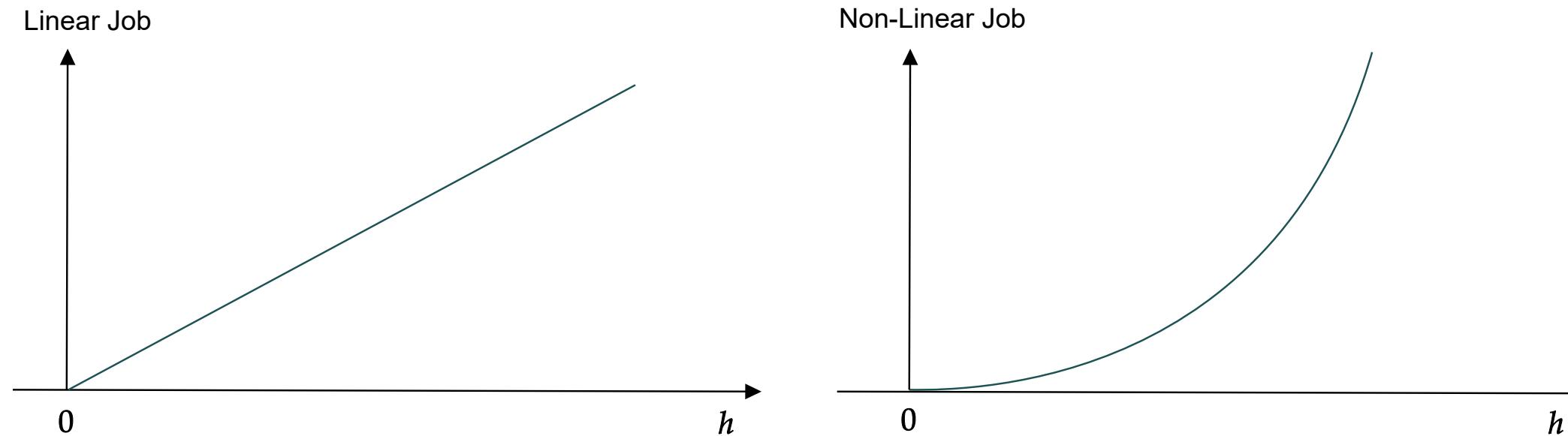
Reasons for Choosing Non-regular Job, Women



Job Flexibility and Convex Earning

Goldin (2014) defines the two types of jobs by **earning schedule**

- **Linear** jobs are lower wages and high flexibility
- **Non-linear** (convex) jobs are high wage and low flexibility



These characteristics correspond to **Regular** and **Non-regular** jobs!
Regression ↗

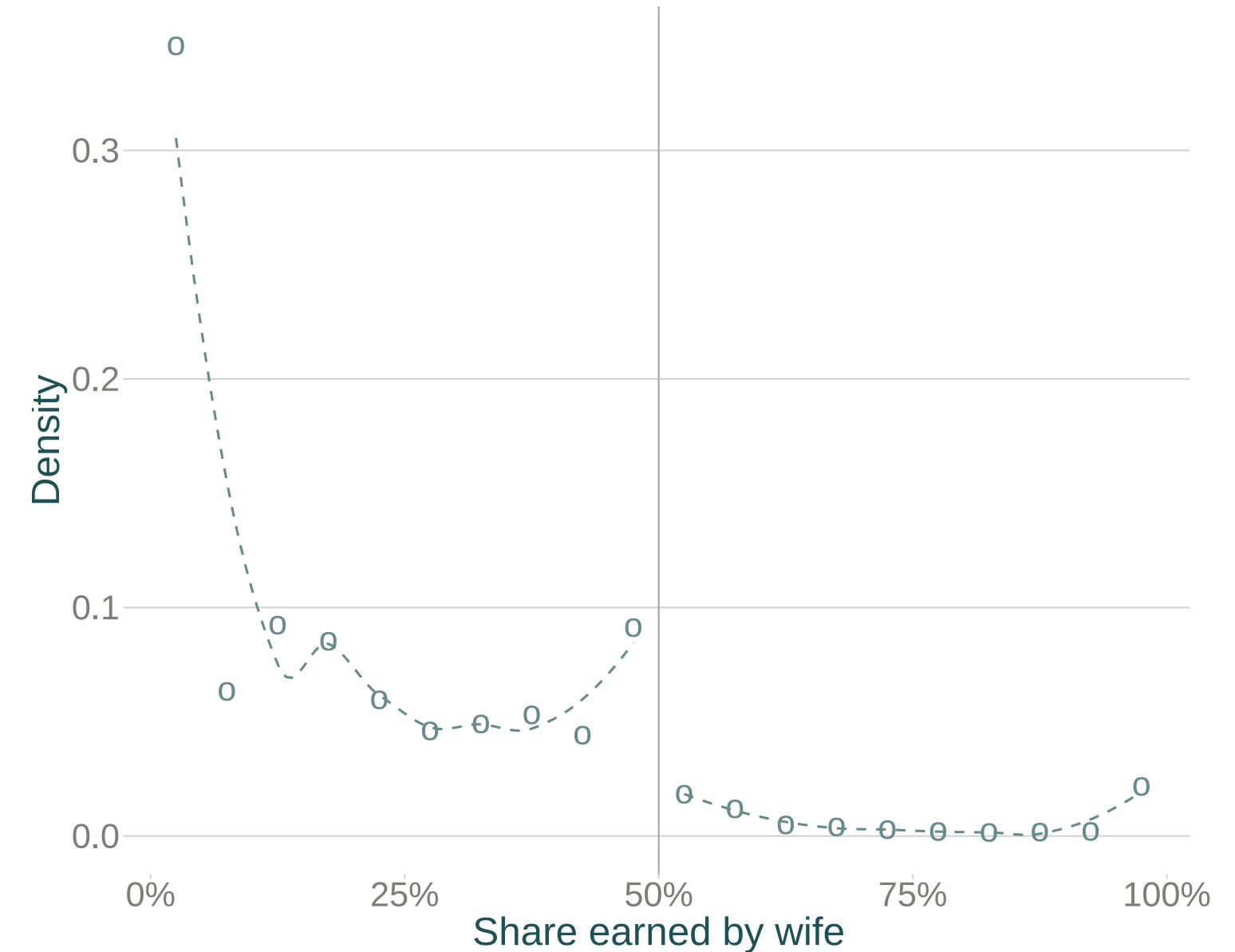
Social Norms

Bertrand, Kamenica, and Pan (2015)

- a gap in the density of wife's share of earnings in couples at 50% in US
- interpreted as the existence of social norms

Japanese Data

- stark gap is seen in Japanese data
- rising pattern just before 50%



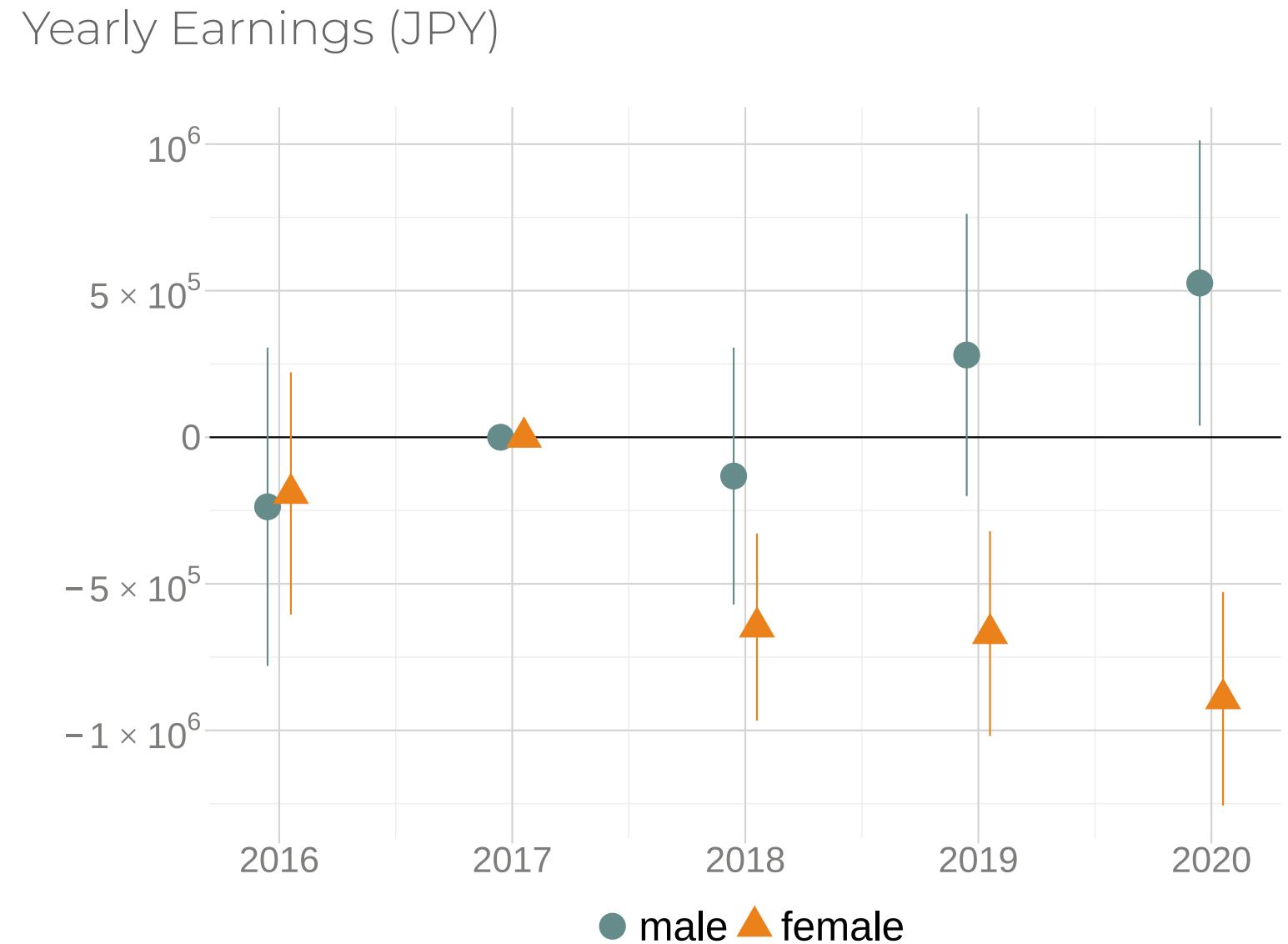
Marriage Penalty

If there are social norms regarding wives earning more than husbands, after the marriage, women might choose:

- lower working hours
- changing/quitting jobs

Using JPSED2016-2020, I see

- Men and Women married at 2018
- Change in market outcomes in 2017
- Child Penalty as in Kleven, Landais, and Søgaard (2019)



Female earnings decline by 4496 EUR
1-year after the marriage
Other Outcomes ↗

Key Features

1. Regular vs. Non-regular
2. Social norms on wife's earnings

Four Key Gender Gaps

Sample: married, 25-59 aged in JPSED2016-2020

1. Participation Rate (0.27)

98 % (male) - 70 % (female)

2. Occupational Choices (0.59)

Fraction of regular workers. 89 % (male) - 32 % (female)

3. Labor Hours (0.49)

Mean of *log* working hours. 44.2 hours (male), 20.3 hours (female) per week

4. Wage (0.76)

Mean of *log* wage. 2958 JPY (male), 1534 JPY (female)

Model

Households' Problem

- Economy consists of couples, including husbands ($g = m$) and wives ($g = f$)
- choose an occupation j_g from regular R , non-regular NR , not-working NW
- Endowed one unit of time, and choose working hours h_m, h_f , home hours T_m, T_f , and leisure $1 - h_m - T_m, 1 - h_f - T_f$

$$\max_{h_m, h_f, T_m, T_f, j_m, j_f} U = \log c + \gamma \log H(1 - h_m - T_m, 1 - h_f - T_f) - \delta I\{e_m < e_f\}$$

subject to

$$c = e(h_m, j_m) + e(h_f, j_f)$$
$$T = T_m + T_f$$

$H(\cdot)$: Joint leisure function

$e(h, j)$: Earning

T : Home hours requirement

δ : Utility cost

Productivity

Each husband and wife is endowed job specific productivity:

$$\begin{pmatrix} a_{m,R} \\ a_{f,R} \\ a_{m,NR} \\ a_{f,NR} \end{pmatrix} \sim \log \mathcal{N} \left(\begin{pmatrix} 0 \\ 0 \\ \mu_{NR} \\ \mu_{NR} \end{pmatrix}, \begin{pmatrix} \sigma^2 & \rho_{mf}\sigma^2 & \rho_{R,NR}\sigma^2 & \rho_{R,NR}\rho_{mf}\sigma^2 \\ \cdot & \sigma^2 & \rho_{R,NR}\rho_{mf}\sigma^2 & \rho_{R,NR}\sigma^2 \\ \cdot & \cdot & \sigma^2 & \rho_{mf}\sigma^2 \\ \cdot & \cdot & \cdot & \sigma^2 \end{pmatrix} \right)$$

$\mu_{NR} < 0 \Rightarrow$ Non-regular workers earns less than regular worker

$\rho_{mf} > 0 \Rightarrow$ Assortative Mating

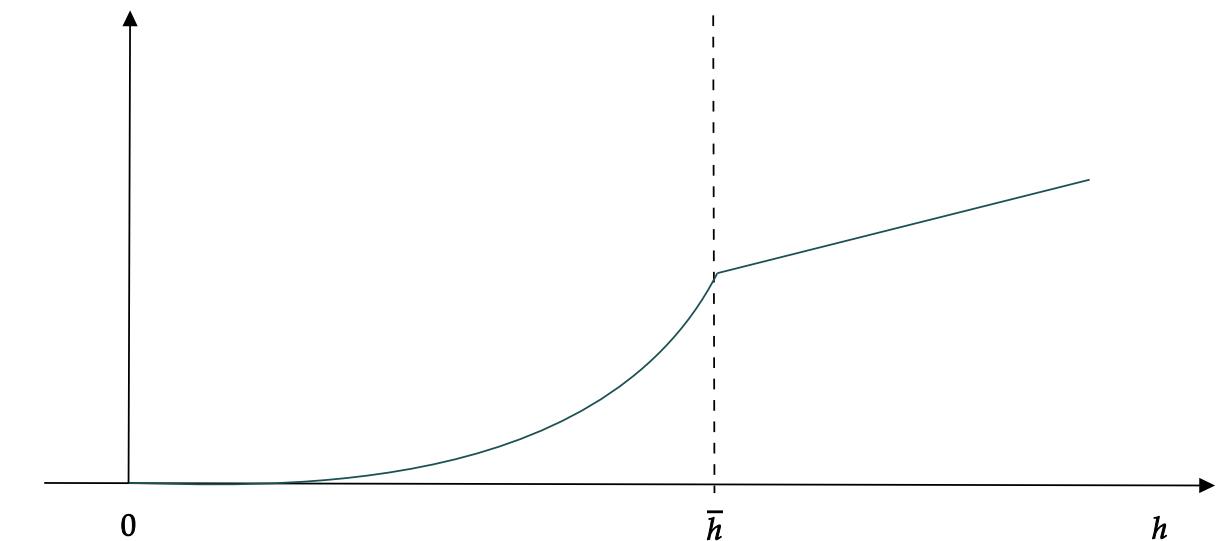
$\rho_{R,NR} > 0 \Rightarrow$ Regular and Non-regular abilities are linked

No Gender Difference in Productivity

Convex Wage Schedules

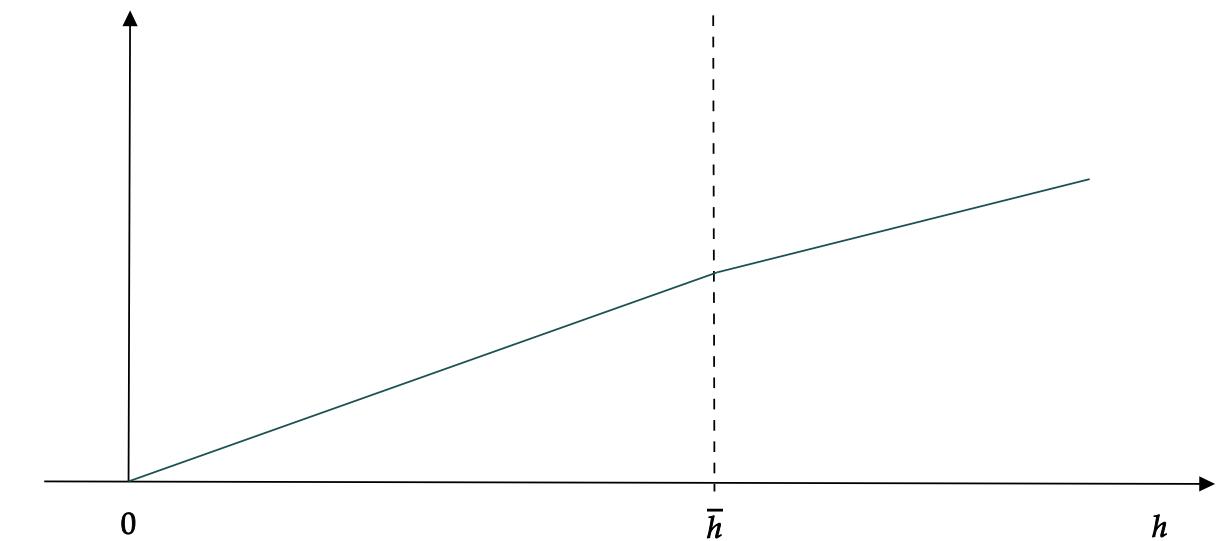
Regular Jobs

$$e(h, R) = \begin{cases} a_R h^{1+\theta} & h < \bar{h} \\ a_R (\bar{h}^{1+\theta} + \lambda_R \bar{h}^\theta (h - \bar{h})) & h > \bar{h} \end{cases}$$



Non-regular Jobs

$$e(h, NR) = \begin{cases} a_{NR} h & h \leq \bar{h} \\ a_{NR} (\bar{h} + \lambda_{NR} (h - \bar{h})) & h > \bar{h} \end{cases}$$



Leisure Function

$$H = (\nu(1 - h_m - T_m)^\xi + (1 - \nu)(1 - h_f - T_f)^\xi)^{1/\xi}$$

ν : share parameter. Each household is endowed $\nu \sim Beta(\alpha_\nu, \beta_\nu)$

ξ : complementarity. $\xi < 0 \Rightarrow$ complement

Home Hours Requirement

$$T = T_m + T_f$$

$$\frac{1}{2}T \sim Beta(\alpha_T, \beta_T)$$

- Households has a home hours requirement $T \in [0, 2]$
- T does not increase the utility
- captures the heterogeneity of home hours requirements (children)

Estimation

Calibration Strategy

15 Parameters

$$\{ \underbrace{\lambda_R, \lambda_{NR}, \theta}_{\text{production function}}, \underbrace{\mu_{NR}, \sigma^2, \rho_{R,NR}, \rho_{mf}}_{\text{productivity}}, \underbrace{\gamma, \xi, \alpha_\nu, \beta_\nu}_{\text{leisure}}, \underbrace{\alpha_T, \beta_T}_{\text{home hours}}, \underbrace{\alpha_\delta, \beta_\delta}_{\text{social norm}} \}$$

Method of Simulated Moments

1. Model produces occupations, working hours, and wages of household
2. Compute 15 moments (e.g. ratio of regular workers, mean of working hours, gender correlation of wage...)
3. Minimize the distance between moments from data and model

Estimation

Parameter	Value	Target	Data	Model
λ_R	0.57	mean of h_f for regular workers	0.50	0.48
λ_{NR}	0.63	mean of h_f for NR workers	0.30	0.27
θ	2.96	share of regular workers, females	0.32	0.37
μ_{NR}	-3.15	share of NR workers, females	0.38	0.28
σ	1.03	s.d. of $\ln w_f$ for R workers	0.72	0.72
$\rho_{R, NR}$	0.14	mean diff. of $\ln w_{f, R}$ and $\ln w_{f, NR}$	0.62	0.62
ρ_{mf}	0.01	corr. of log wages, R×R couples	0.49	0.50
γ	0.84	s.d. of h_f for regular workers	0.11	0.11
ξ	-8.29	s.d. of h_f for NR workers	0.14	0.15
α_v	13.04	mean of T_m for regular workers	0.14	0.13
β_v	1.15	mean of T_m for NR workers	0.13	0.14
α_T	1.59	mean of T_f for regular workers	0.28	0.21
β_T	3.57	mean of T_f for NR workers	0.32	0.37
α_δ	0.59	share of couples with $e_m < e_f$	0.07	0.08
β_δ	11.81	corr. of working hours, couples	0.19	0.18

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$$\alpha_\nu = 13.04, \beta_\nu = 1.15$$

- $E[\nu] = 0.92 > 0.5$
- Husbands have a higher weight on joint leisure

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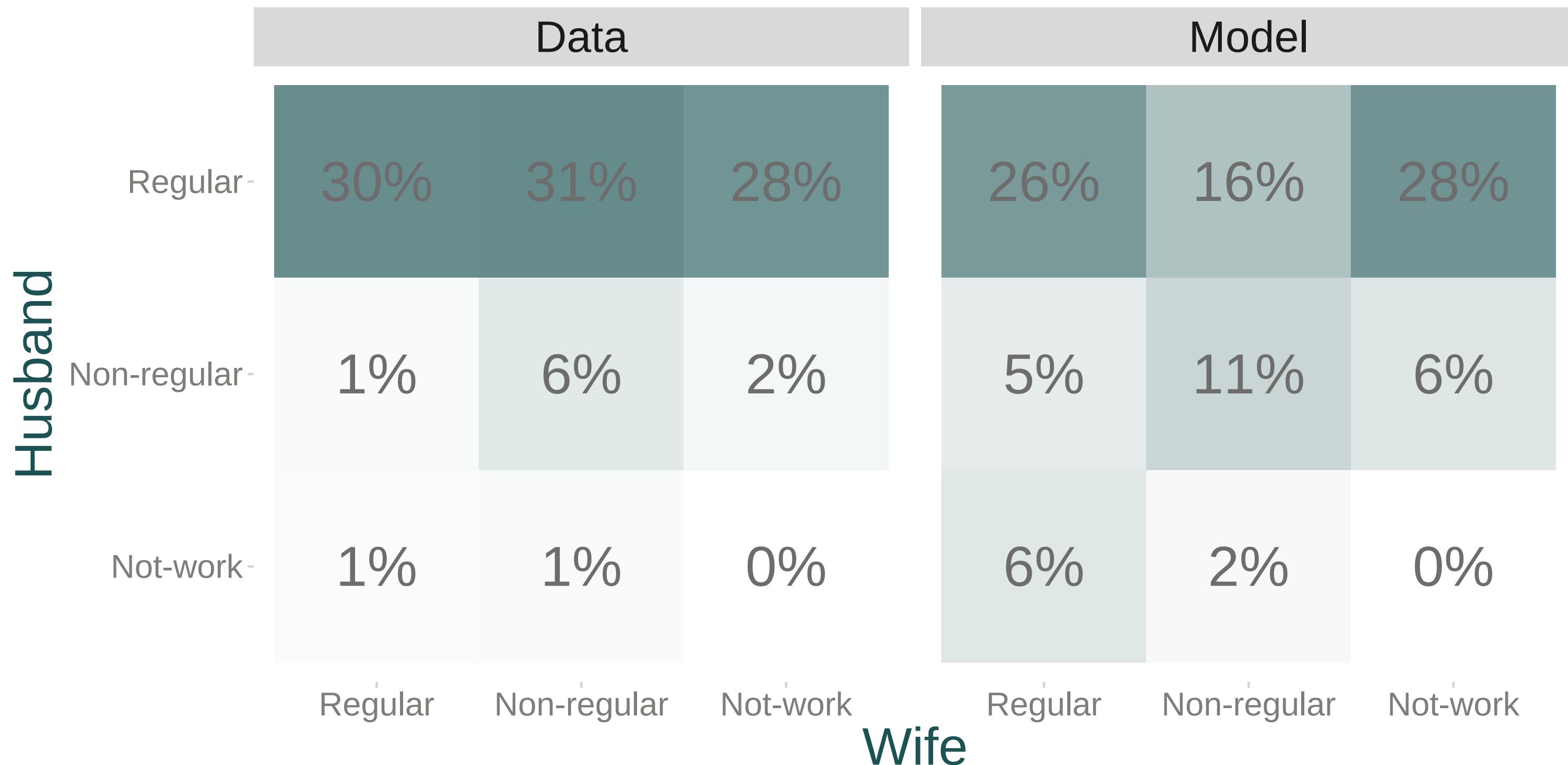
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$$\alpha_T = 1.59, \beta_T = 3.57$$

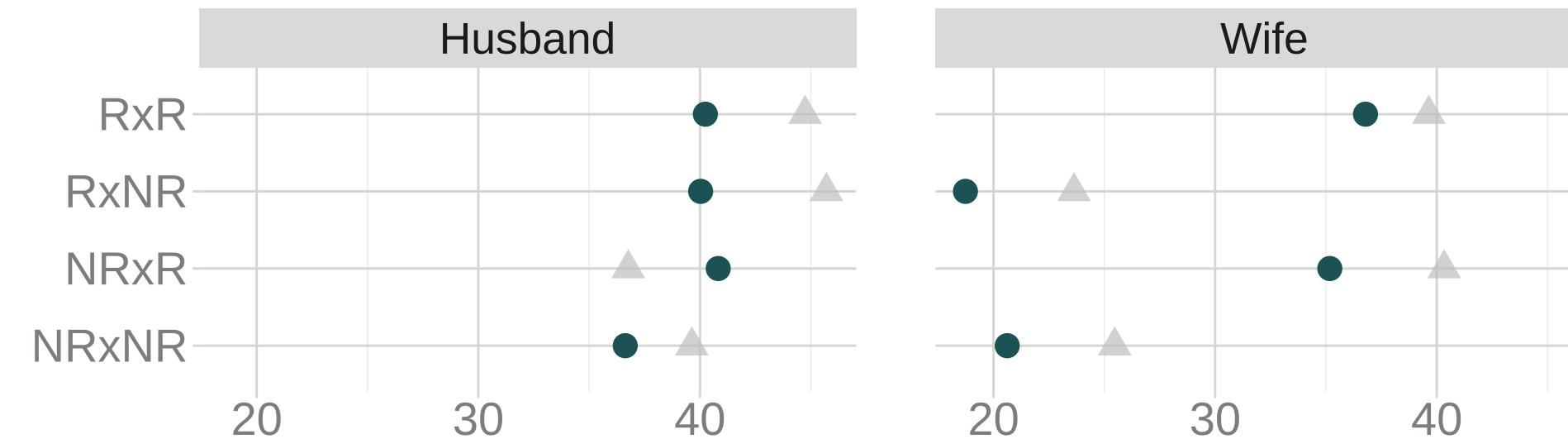
- Home hours requirement is 49 hours per week

Occupational Choices (Not-Targeted)

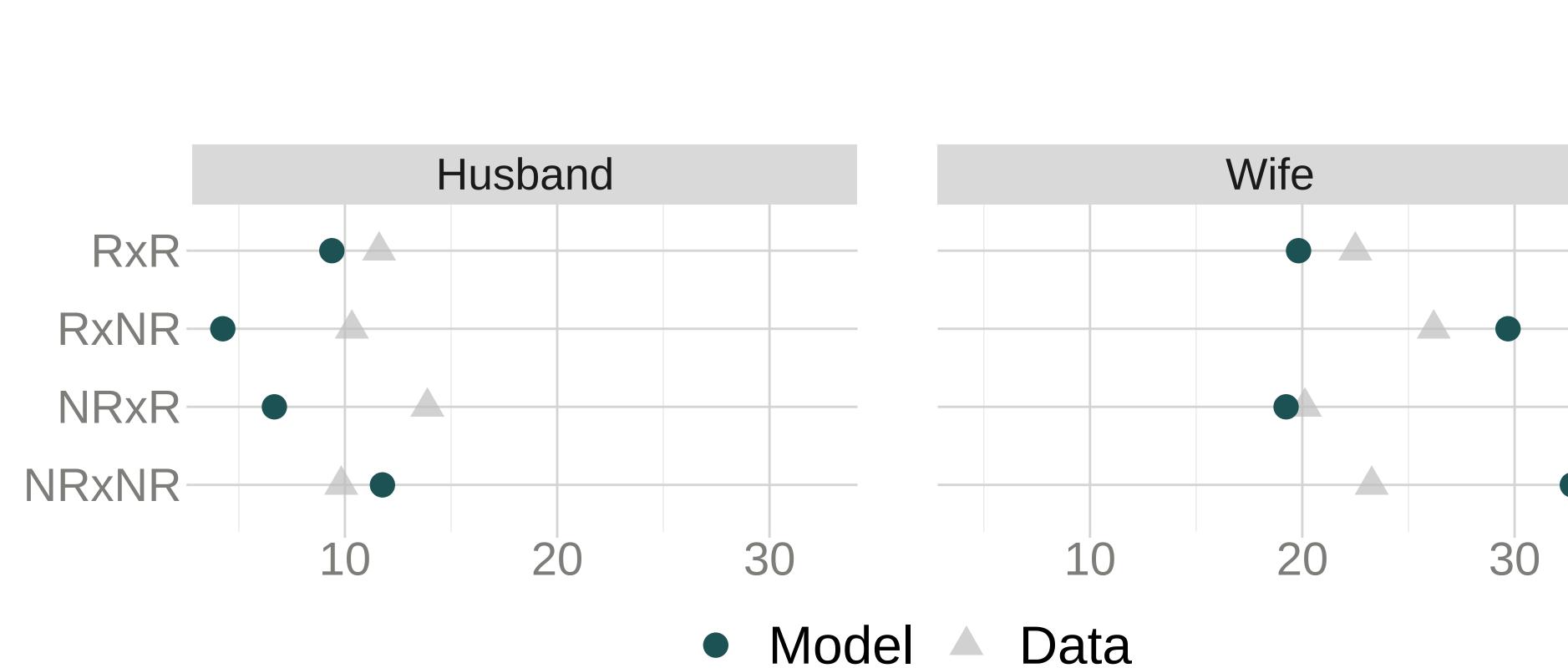


Time Allocations (Not-Targeted)

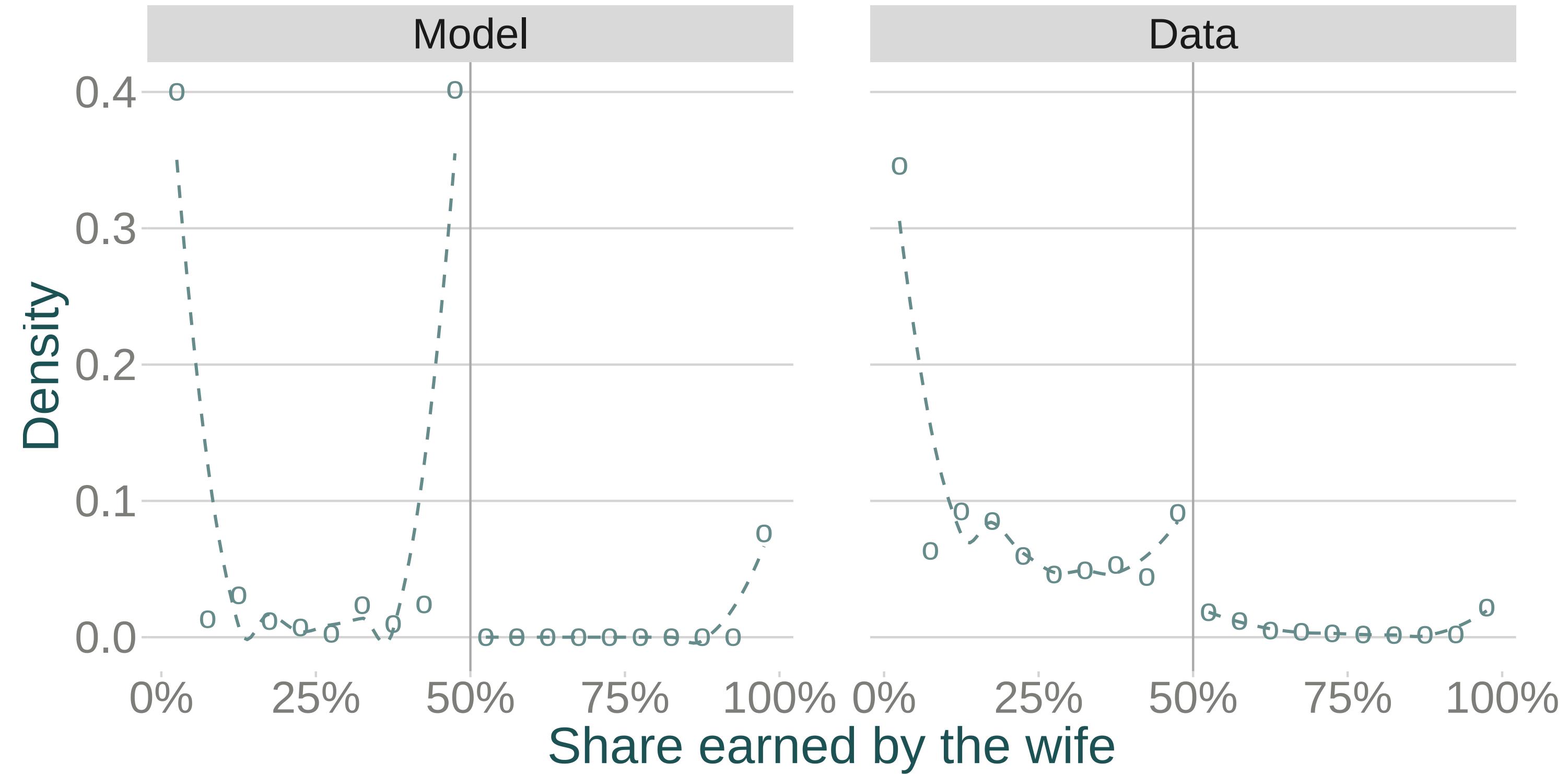
Hours Worked



Home Hours



Social Norms



Gender Gaps

	Data	Model	Model / Data	Pct.
Participation	0.27	0.27	<div style="width: 99%; background-color: #1f77b4;"></div>	99%
Occupation	0.59	0.19	<div style="width: 33%; background-color: #1f77b4;"></div> <div style="width: 67%; background-color: #e0e0e0;"></div>	33%
Labor Hours	0.49	0.36	<div style="width: 74%; background-color: #1f77b4;"></div> <div style="width: 26%; background-color: #e0e0e0;"></div>	74%
Wage	0.76	0.26	<div style="width: 34%; background-color: #1f77b4;"></div> <div style="width: 66%; background-color: #e0e0e0;"></div>	34%

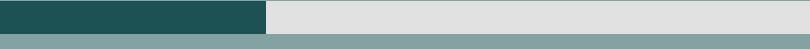
Gender Gaps

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Participation	0.27	0.27	<div style="width: 99%; background-color: #2c3e50; height: 10px;"></div>	99%
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Model explains

- Almost all the gap in the participation rate

Gender Gaps

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Model explains

- Almost all the gap in the participation rate
- Significant proportion of other gender gaps

Mechanism

Why Are the Gaps Large in Japan?

1. Inflexibility of Regular Job θ

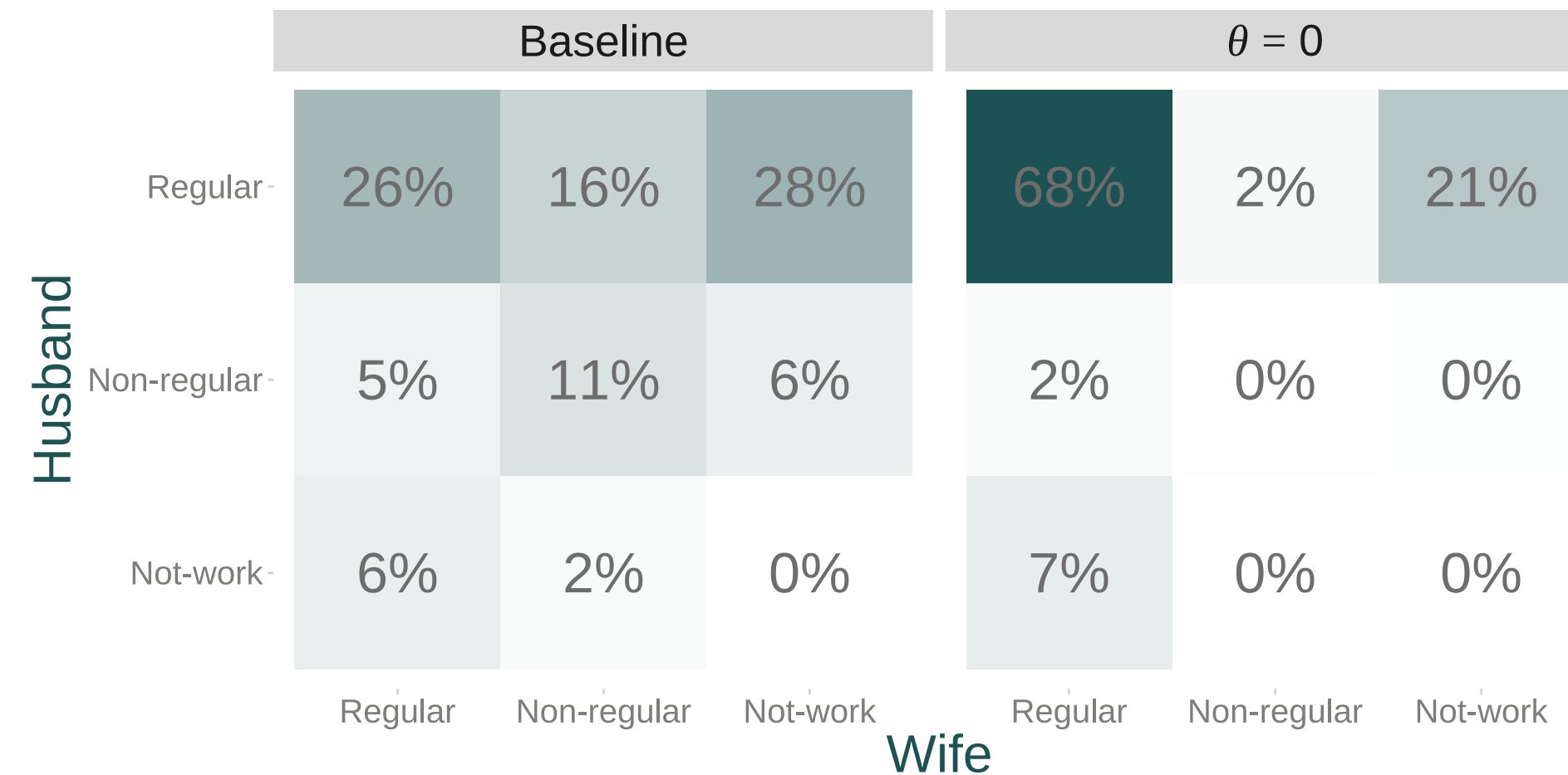
Given a large amount of housework, women might not choose regular jobs

2. Social Norms δ

Social norms might lead wives to work less or not

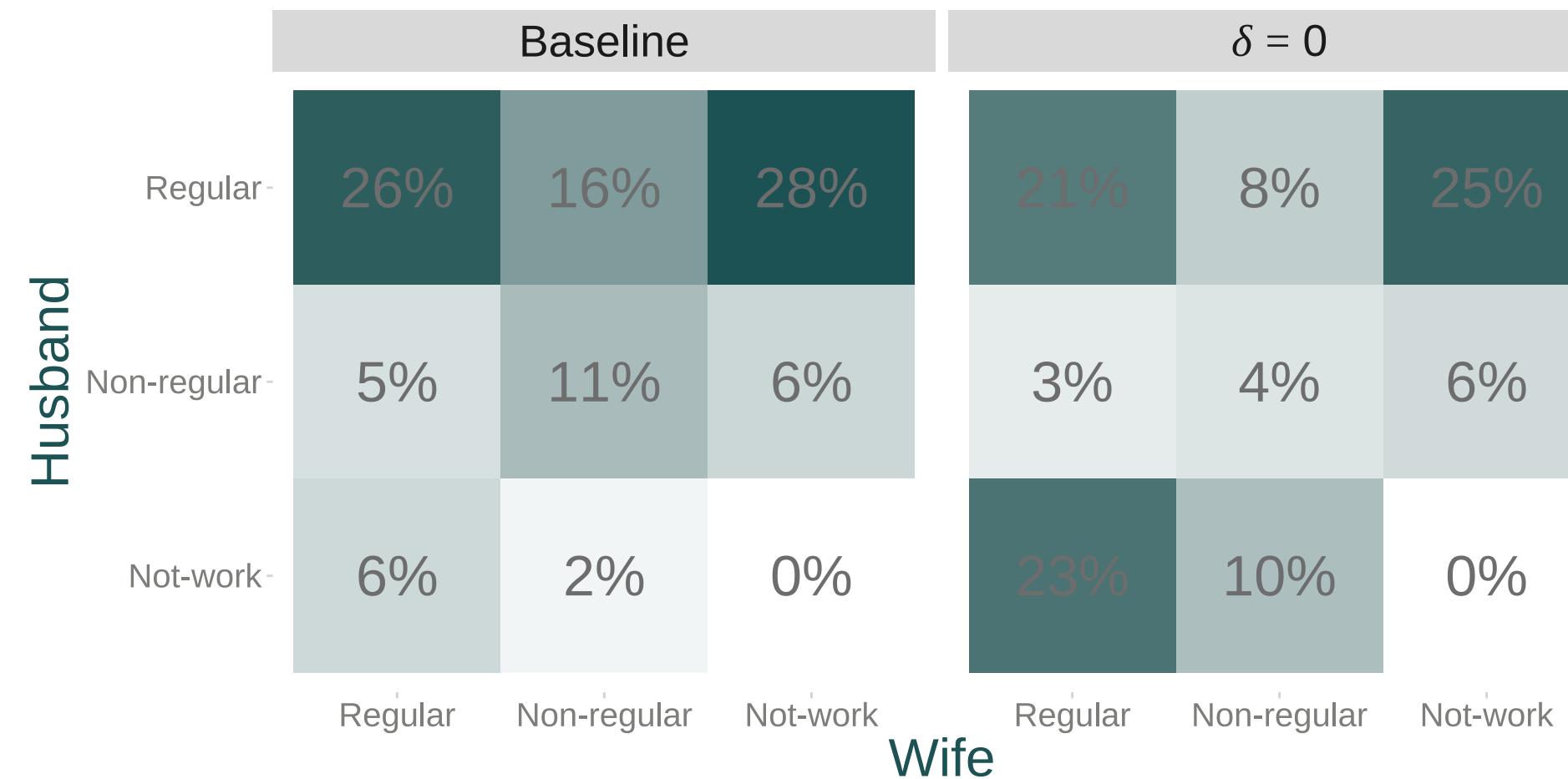
To verify these arguments, I conduct experiments of $\theta = 0$ and $\delta = 0$

Flexible Regular Job: Occupational Choices



Eliminating inflexibility encourages wives to have **regular** jobs

No Social Norm: Occupational Choices



No social norms \Rightarrow More wives choose **regular job**
 \Rightarrow More husbands choose **not to work**

Mechanism

	Baseline	$\theta = 0.0$	$\delta = 0.0$	Gap θ	Gap δ
Participation	0.27	0.14	-0.04		
Occupation	0.19	0.01	0.18		
Labor Hours	0.36	0.64	0.17		
Wage	0.26	-0.03	0.22		

Mechanism

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Job inflexibility θ

- The main element prevents women from having regular jobs
- Wage gap comes from occupational differences

Mechanism

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Job inflexibility θ

- The main element that prevents women from having regular jobs
- Wage gap comes from occupational differences

Social Norms δ

- Explains intensive and extensive margin of male and female participation

Conclusion

Build a Model

- Regular (inflexible, high wage) vs. Non-Regular (flexible, low wage)
- Social Norms (wives' higher earnings)

Model Explains the Gender Gaps

- Almost all of participation rate
- 33% in occupational choices, 74% in labor hours, and 34% in wage

Mechanism

- Job flexibility and social norm play an important role in gender gaps
- Housework services could reduce the gaps under job inflexibility and social norm ([Appendix[↗]](#))

Outsourcing of Housework

Outsourcing of Housework

Outsourcing housework could increase women's labor supply

Raz-Yurovich and Marx ([2019](#)), Halldén and Stenberg ([2014](#))

Also discussed as the impact of low-skilled immigrants

Cortés and Tessada ([2011](#)), Barone and Mocetti ([2011](#)), Farré, González, and Ortega ([2011](#))

However, those housework services are *rarely* used in Japan

- Japan has a restrictive policy on immigration
- 2+ member households pay 7.3 EUR per YEAR on average

Baseline Model with Housework Service

$$\max_{h_m, h_f, j_m, j_f} U = \log c + \gamma \log H - \delta 1(e_m < e_f)$$

subject to

$$\begin{aligned}c + pt &= e(h_m, j_m) + e(h_f, j_f) \\H &= (\nu(1 - h_m - T_m)^\xi + (1 - \nu)(1 - h_f - T_f)^\xi)^{1/\xi} \\T &= T_m + T_f + t\end{aligned}$$

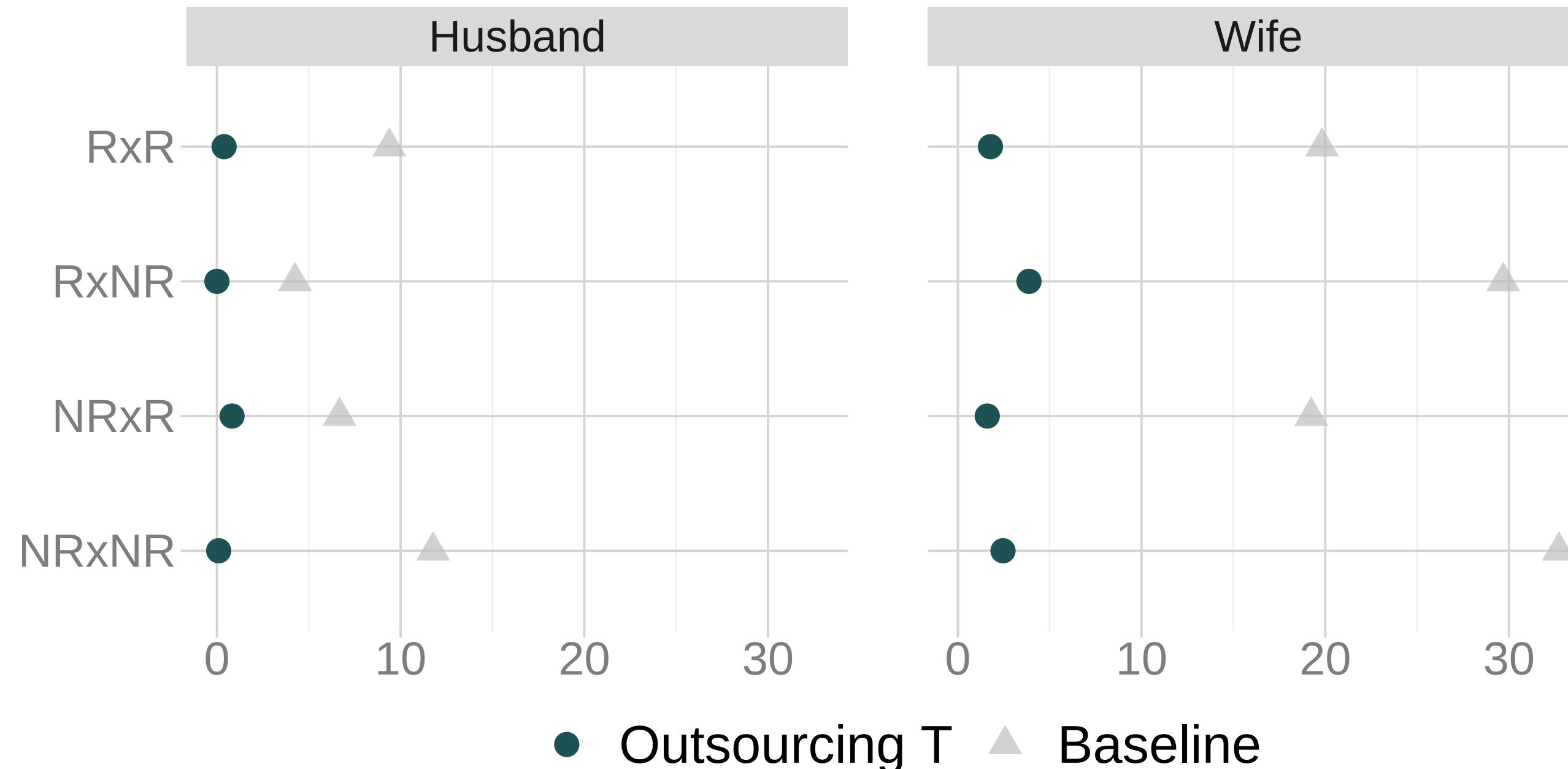
t : housework service

p : price of housework service

Experiment:

- Fix parameters in the baseline model
- Set price as the median wage of non-regular job ($p = \exp(\mu_{a_{NR}})$)

Outsourcing T : Home Hours



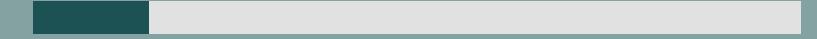
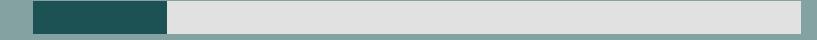
Workers use outside services to do most of the home work

Outsourcing T : Gender Gaps

	Base	Outsourcing t	Gap remained	Pct.
Participation	0.27	-0.02		-7%
Occupation	0.19	0.03	 	15%
Labor Hours	0.36	0.06	 	17%
Wage	0.26	0.25		97%

Given social norms, housework services

Outsourcing T : Gender Gaps

	Base	Outsourcing t	Gap remained	Pct.
Participation	0.27	-0.02		-7%
Occupation	0.19	0.03		15%
Labor Hours	0.36	0.06		17%
Wage	0.26	0.25		97%

Given social norms, housework services

- Reduce gender gaps in participation, occ. choices, and labor hours

Outsourcing T : Gender Gaps

	Base	Outsourcing t	Gap remained	Pct.
Participation	0.27	-0.02		-7%
Occupation	0.19	0.03	 	15%
Labor Hours	0.36	0.06	 	17%
Wage	0.26	0.25	 	97%

Given social norms, housework services

- Reduce gender gaps in participation, occupational choices, and labor hours
- Do not reduce wage gap

Slide ←

Appendix

Related Literature

Home Hours and Gender Gaps

Erosa et al. (2022)

- Models couples' decisions on occupations with different job flexibility

Cubas, Juhn, and Silos (2019)

- Women are penalized for the lack of work in the peak hours (8am-5pm)

Social Norms and Occupational Choices

Bertrand, Kamenica, and Pan (2015)

- A sharp gap in the wife's earnings relative to the husband's earnings

Gender Gaps in Japan

Kitao and Mikoshiba (2022)

- Role of fiscal policies on female labor force participation and occ. choices

Job Flexibility and Convex Earning

To see the convex and linear wage schedules, similar to
Bick, Blandin, and Rogerson (2022),

$$y_{it} = a_i + \lambda_t + \left(\sum_{h \in H, h \neq 40} \beta_h I_{ith} \right) + \gamma X_{it} + \varepsilon_{it}$$

y_{it} : yearly earnings of individual i at time t

a_i : individual fixed effect

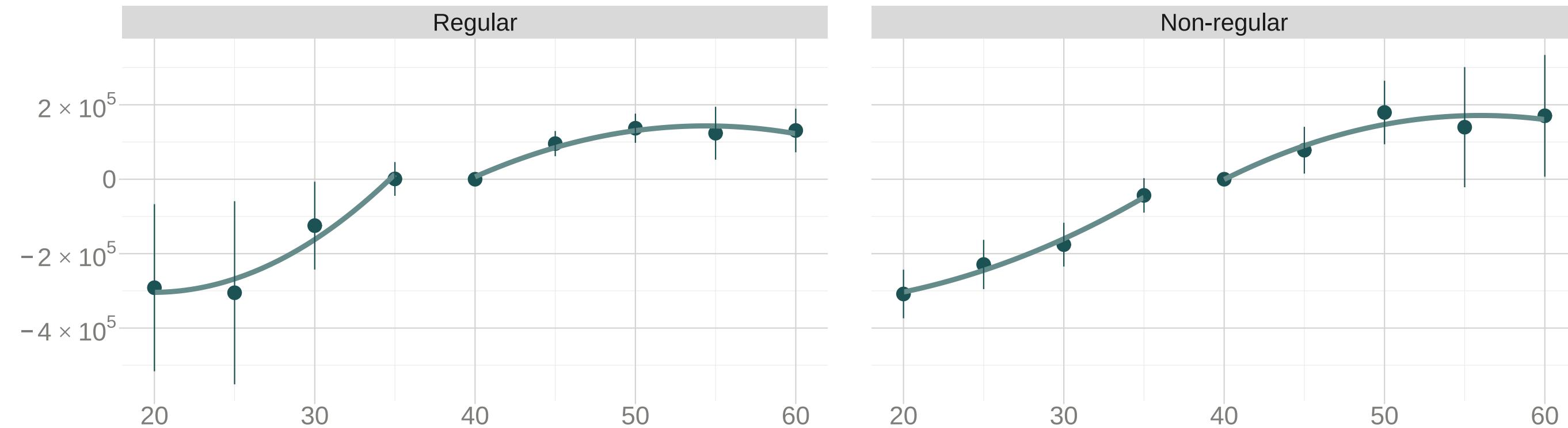
λ_t : time fixed effect

X_{it} : age, age-square, educational attainment, industry

$H = \{20\text{-}24, 25\text{-}29, \dots, 60\text{-}64\}$: 5 hour bins for weekly working hours

I_{ith} : indicator if i 's working hours in the bin $h \in H$ at time t

Earning Curves



Regular Jobs

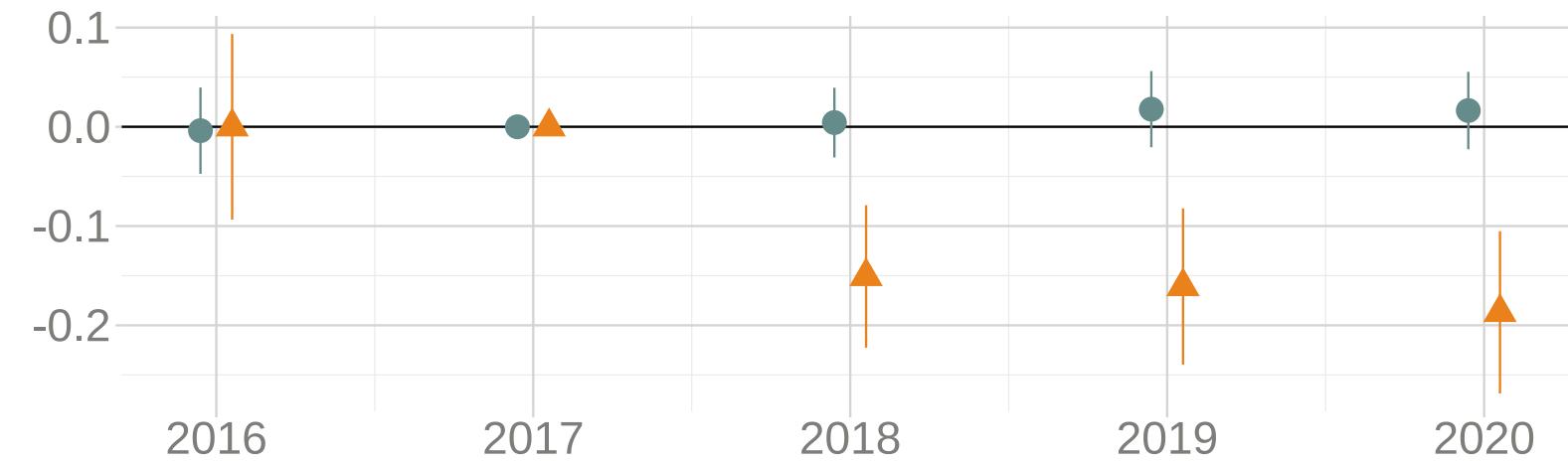
- Convexity before 40 hours
⇒ Concentration at 40 hours
- After 40 hours, the slope is different from the below-40-hour

Non-regular Jobs

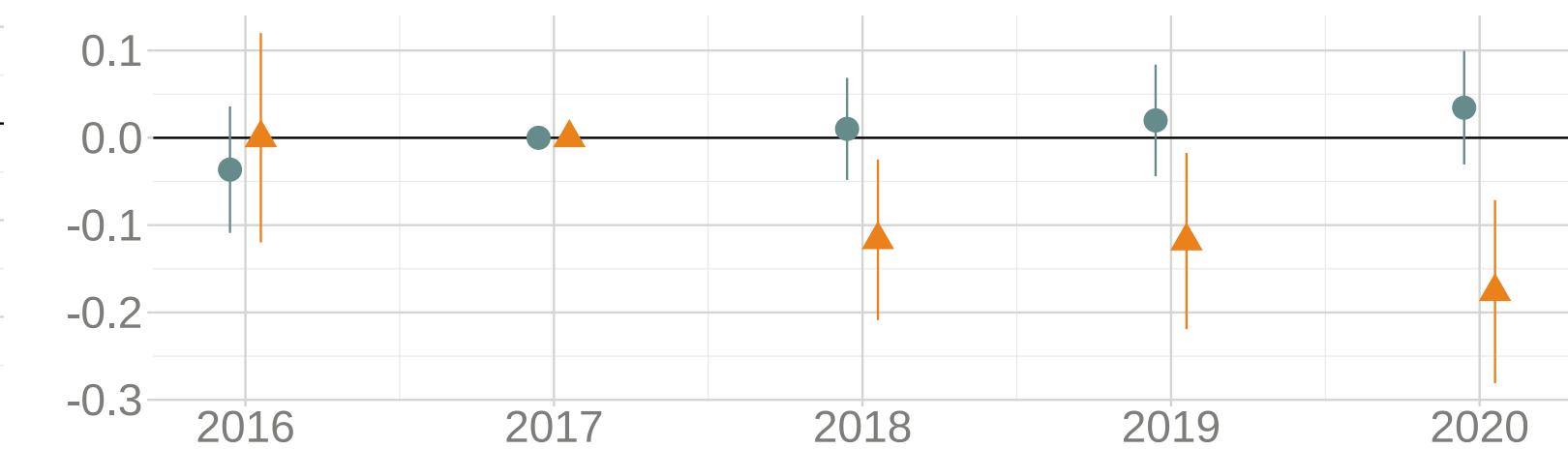
- Almost linear relationship

Marriage Penalty

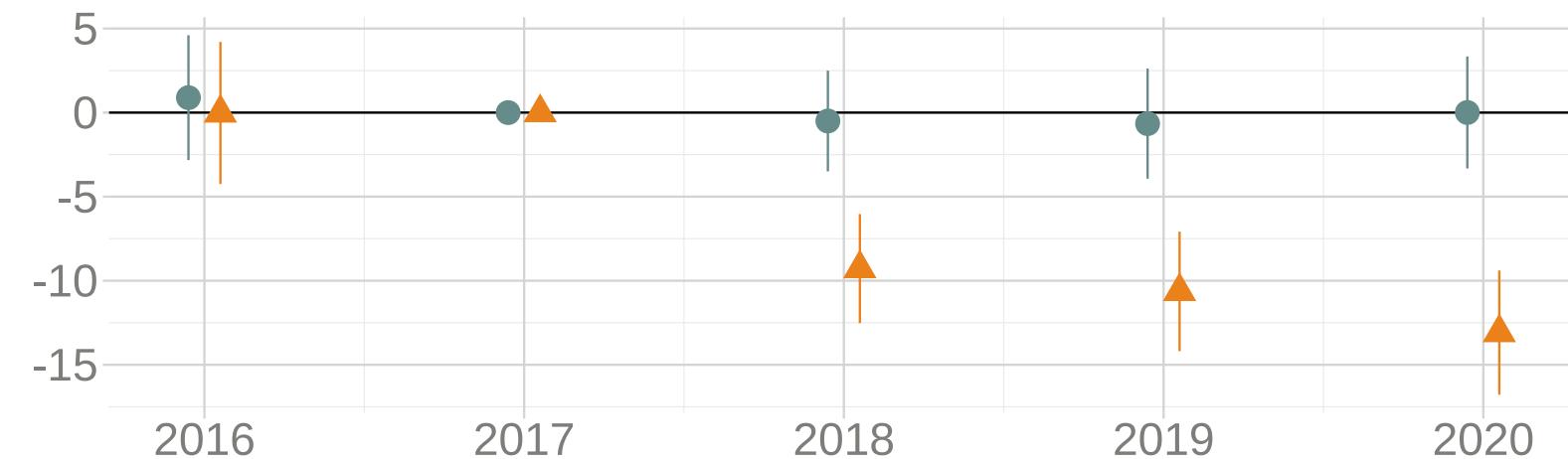
Participation Rate



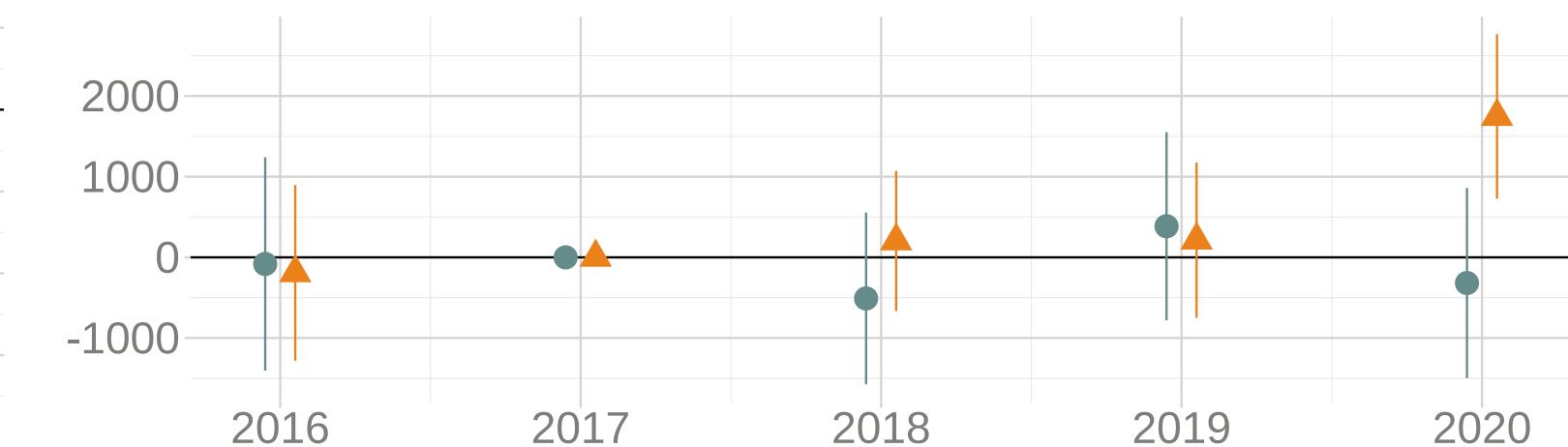
Ratio of Regular Workers



Weekly Working Hours



Hourly Wage (JPY)



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