Online Appendix for "Why Women Work the Way They Do in Japan: Roles of Fiscal Policies"

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This online appendix contains additional details of the model, the data and calibration for Kitao and Mikoshiba (2020).

1 The JPSC Data

This section provides more details about our use of the JPSC data and calibration of the model.

1.1 JPSC Samples and Employment Classifications

Sample: We focus on a sample of women who are included in Cohort A of the JPSC. Individuals of the cohort were born between 1959-1969, and we have information until 2018, when they are 49-59 years old.

We focus on employed individuals and those not in labor force, and exclude self-employed individuals. We use samples for whom there are at least two consecutive years of observations. We also exclude observations of individuals, when they reside abroad or in an unknown location, and those with missing information about key variables, including age, marital status, employment type, and education level. Out of the original sample of 1,500 women in the cohort and their 25,430 yearly observations, we use a sample of 1,103 women and their 19,548 observations in our calibration.

Employment Type Classifications: In classifying female workers' employment types, we use JPSC's questions about an individual's job. A question of the JPSC survey asks what is the job of each respondent and answers are (1) regular job (*seishain* or *seishokuin*),

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(2) part-time job, and (3) entrusted job (*shokutaku*) and others, in 1993-2009. After 2009, the answers include more items (1) regular job, (2) dispatched worker, (3) contract or entrusted job and others, (4) part-time job and (5) self-employed and family employee. We exclude self-employed based on answers to different questions (Q1025, Q144, and Q859) and group remaining employed workers answering (1) into regular group, and (2) and (3) of 1993-2009 surveys and (2)-(4) of 2009-2018 surveys into contingent group.

1.2 Children of Married Couples

We use the equivalence scale of the OECD to adjust for the family size in computing consumption of households. There is one adult in a household of a single man and woman and there are two adults plus children in a married couple. For the number of children aged 18 and below, we use the JPSC data by computing the average number of children by the age and skill level of married women. Figure 1 shows the average number of children aged 18 and below for women by age and skill.
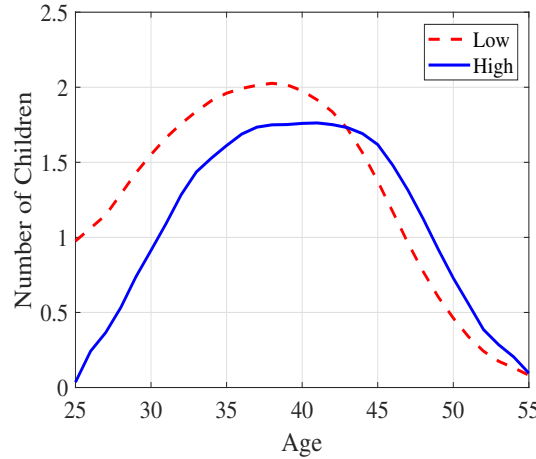

Figure 1: Average Number of Children in Married Couples by Age and Skill of Women: JPSC Data

1.3 Earnings of Men

We use earnings data of our JPSC samples' husbands. The profiles of earnings for low and high-skilled men are in line with those estimated with other data source such as the BSWS.[1] Figure 2 shows men's average earnings by age and skill.

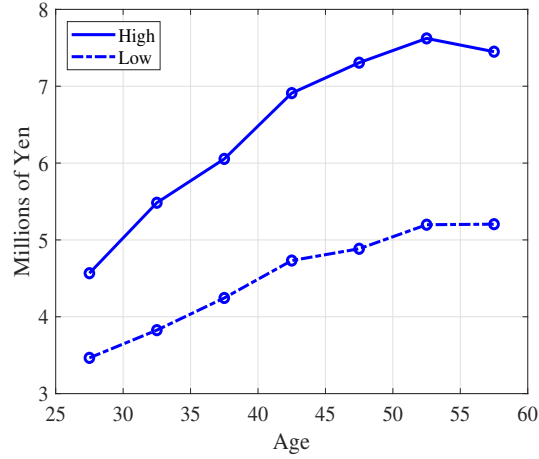[1]See, for example, Kitao and Mikoshiba (2020)).

Figure 2: Men's Earnings by Skill: JPSC Data

1.4 Participation Rates and Earnings of the ESS Data

In this section, we report the average participation rates and earnings for men and women using the Employment Status Survey (ESS) of the Ministry of Internal Affairs and Communications. The ESS is a large-scale cross-sectional survey of individuals conducted every five years, which covers more than 500,000 households and 1.1 million individuals.[2] We use the data from seven surveys between 1987 and 2017 to study the labor market experience of individuals born between 1963 and 1967. Although the ESS is not a panel data set, we construct the labor market profiles of a synthetic cohort by connecting data of different age groups over the thirty-year period.

Figure 3a shows participation rates of the 1963-67 cohort and Figure 3b shows their average earnings. The profiles are in line with the JPSC data we reported in the paper.

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[2]The figures are for the 2017 survey, the most recent survey data available at the webpage. The survey was conducted every three years until 1982 and every five years since 1987.
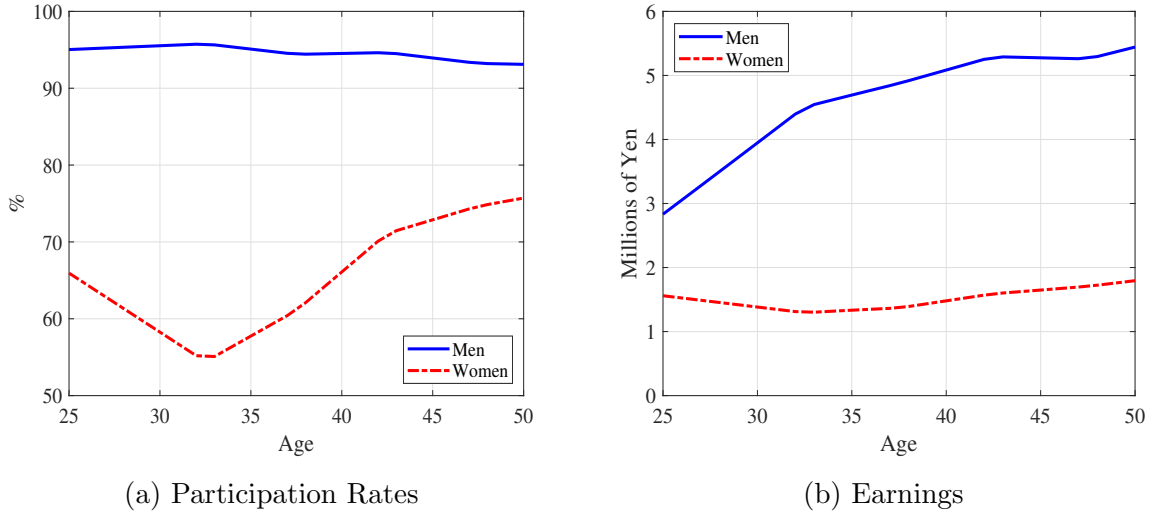
(a) Participation Rates　　　　　　(b) Earnings

Figure 3: Employment Status Survey (ESS) Data

2　Calibration: Fiscal Policies

2.1　Labor Income Tax Rates

Labor income tax is progressive and consists of taxes at the national and local levels. The range of marginal tax rates at the national level changed over our sample years, from 10-50% in 1989 to current 5-45%, as shown in Table 1. Local taxes are shown in Table 2.[3] We use the sum of these in the computation.

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[3]Note that in our simulations we let individuals enter the labor market at age 25 in 1989.

Table 1: Progressive Labor Income Tax Rates at the National Level

Years	Labor income (million yen)	Tax Rate (%)
1989-1994	$y \leq 3$	10
	$3 < y \leq 6$	20
	$6 < y \leq 10$	30
	$10 < y \leq 20$	40
	$y > 20$	50
1995-1998	$y \leq 3.3$	10
	$3.3 < y \leq 9$	20
	$9 < y \leq 18$	30
	$18 < y \leq 30$	40
	$y > 30$	50
1999-2006	$y \leq 3.3$	10
	$3.3 < y \leq 9$	20
	$9 < y \leq 18$	30
	$y > 18$	37
2007-2014	$y \leq 1.95$	5
	$1.95 < y \leq 3.3$	10
	$3.3 < y \leq 6.95$	20
	$6.95 < y \leq 9$	23
	$9 < y \leq 18$	33
	$y > 18$	40
2008-present	$y \leq 1.95$	5
	$1.95 < y \leq 3.3$	10
	$3.3 < y \leq 6.95$	20
	$6.95 < y \leq 9$	23
	$9 < y \leq 18$	33
	$18 < y \leq 40$	40
	$y > 40$	45

Source: The Ministry of Finance (*Zaisei kinyu tokei geppo*).

Table 2: Labor Income Tax Rates at the Local Level

Years	Labor income (million yen)	Tax Rate (%)
1989-1990	$y \leq 1.2$	5
	$1.2 < y \leq 5$	10
	$y > 5$	15
1991-1994	$y \leq 1.6$	5
	$1.6 < y \leq 5.5$	10
	$y > 5.5$	15
1995-1996	$y \leq 2$	5
	$2 < y \leq 7$	10
	$y > 7$	15
1997-1998	$y \leq 2$	5
	$2 < y \leq 7$	10
	$y > 7$	15
1999-2006	$y \leq 2$	5
	$2 < y \leq 7$	10
	$y > 7$	13
2007-present	All y	10

Source: The Ministry of Internal Affairs and Communications (*Chihouzei ni kansuru toukeitou*). Tax rates are the sum of taxes at city and prefecture levels.

2.2 Income Tax Deductions

Labor income tax is computed by first subtracting deductions from gross earnings and then multiplying progressive tax rates at each tax bracket as presented above. Our model includes three deductions: basic deductions (*kiso koujo*), salary income deductions (*kyuyo shotoku koujo*) and spousal deductions. Spousal deductions include both regular spousal deductions (*haigusha koujo*) and special spousal deductions (*haigusha tokubetsu koujo*).

Basic deductions are a fixed amount, 350,000 yen in 1989-1994, 380,000 yen in 1995-2019, and 480,000 yen in 2020 and thereafter. Salary deductions increase in earnings with a minimum amount of 650,000 yen in 1989-2019, and 550,000 yen after 2019. Total deductions including basic and salary income deductions are 1 million yen in 1989-1994 and 1.03 million yen after 1995. Individuals do not pay any labor income tax for earnings below these amount.[4]

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[4]Salary deductions increase in earnings at decreasing rates, which fall from 40% to 0%. See the website of the National Tax Agency for more details about basic and salary income deductions (in Japanese).

The maximum spousal deductions are 760,000 yen in 1987-2003, and are reduced to 380,000 yen in 2004. The amount decreases in earnings of a spouse, as summarized in Table 3.[5]

Table 3: Spousal Deductions (in 1,000 yen)

Spouse's Labor Income (1,000 yen)	Regular Deductions 1987-pres.	Special Deductions			Total Spousal Deductions		
		1987-03	2004-17	2018-pres.	1987-03	2004-17	2018-pres.
0-	380	380	0	0	760	380	380
700-	380	330	0	0	710	380	380
750-	380	280	0	0	660	380	380
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
950-	380	80	0	0	460	380	380
1,000-	380	30	0	0	410	380	380
1,030-	0	380	380	380	380	380	380
1,050-	0	360	360	380	360	360	380
1,100-	0	310	310	380	310	310	380
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
1,400-	0	30	30	380	30	30	380
1,410-	0	0	0	380	0	0	380
1,500-	0	0	0	360	0	0	360
1,550-	0	0	0	310	0	0	310
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
2,016-	0	0	0	0	0	0	0

Source: The National Tax Agency, Yokoyama and Kodama (2016).

2.3 Social Insurance Programs

Public Pension Premiums: Recall that Category-I insured people pay a fixed premium for public pensions and those who are covered by employers as Category-II insured employees pay a fixed fraction of their earnings as premiums.

Basic deductions: https://www.nta.go.jp/taxes/shiraberu/taxanswer/shotoku/1199.htm

Salary income deductions: https://www.nta.go.jp/taxes/shiraberu/taxanswer/shotoku/1410.htm

[5]Yokoyama and Kodama (2016) (Table 1) nicely summarize the history of the spousal deduction policy since it started in 1961. Our table follow their summary, including the policy rules since 1987 and also beyond 2018, which are relevant for our study.

The level of premiums for the Category-I was 96,000 yen annually in 1989 and gradually increased to 159,600 in 2000, and 181,200 in 2010 and it is 199,320 in 2021. The proportional rate for the Category-II rose from 12.4% in 1989 to 17.35% in 2000, 15.704% in 2010 and it has been 18.3% since 2018. The premium is shared equally by an employer and an employee.

The JPSC survey directly asks the insurance categories (Category I, II and III) of women in 2004 and thereafter and their answers are used in computing average insurance premiums. In 1993-2003, they only ask types of public pension and health insurance of each woman, rather than directly about their insurance categories. Therefore, for these years, we construct women's insurance categories using the information about their marital status, labor income, and insurance types of public pension and health insurance.

Health and Long-term Care Insurance Premiums: Premium rate of health insurance of the Japan Health Insurance Association (JHIA, *kyokai kenpo*) are shown in Table 4. Long-term care insurance rates change each year, rising from 0.6% in 2000 to 1.8% in 2021.[6] Note that long-term care insurance started in 2000 and only those aged 40 and above pay the premium. Employers pay half of the premium for both health and long-term care insurance and employees pay the remaining.

Table 4: Health Insurance Premium Rates

Years	Premium Rate (%)
1989	8.3
1990-1991	8.4
1992-1996	8.2
1997-2002	8.5
2003-2009	8.2
2010	9.34
2011	9.5
2012-present	10

Source: The Japan Health Insurance Association (JHIA).

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[6]See the website of the JHIA for more details. https://www.kyoukaikenpo.or.jp/g7/cat330/hokenryouritunohennsenn/. The JHIA is the largest insurance group that provides health and long-term care insurances.

3 Value Functions: One Year before Retirement

The value function of households one year before the retirement are defined similarly to those of working-age households, except that their value functions in the next period are those of retirees. We present below value functions of single women and men and married couples of age $j^R - 1$.

Young Single Women:

$$S^f(j, s_f, a, \mathbf{x}, e_{-1}, \overline{p}_f) = \max_{c, a', e} \left\{ u^S(c/\eta, l_f) + \beta \widetilde{S}^f(j+1, a', \overline{p}'_f) \right\}$$

subject to

$$
\begin{aligned}
(1 + \tau^c)c + a' + o_{j,f} &= Ra + y_f - T^S(y_f) + tr \\
a' &\geq 0
\end{aligned}
$$

Young Single Men:

$$S^m(j, s_m, a) = \max_{c, a'} \left\{ u^S(c/\eta, l_m) + \beta \widetilde{S}^m(j+1, a', \overline{p}'_m) \right\}$$

subject to

$$
\begin{aligned}
(1 + \tau^c)c + a' + o_{j,g} &= Ra + y_m - T^S(y_m) + tr \\
a' &\geq 0
\end{aligned}
$$

Young Married Couples:

$$M(j, s_m, s_f, a, \mathbf{x}, e_{-1}, \overline{p}_f, i_k) = \max_{c, a', e} \left\{ u^M(c/\eta, l_m, l_f) + \beta \widetilde{M}(j+1, a', \overline{p}'_m, \overline{p}'_f) \right\}$$

subject to

$$
\begin{aligned}
(1 + \tau^c)c + a' + \sum_g o_{j,g} &= Ra + \sum_g y_g - T^M(y_m, y_f) + tr \\
a' &\geq 0
\end{aligned}
$$

References

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