Why Women Work the Way They Do in Japan: Roles of Fiscal Policies *

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Abstract

Women work less often and earn significantly less than men in Japan. We use panel data to investigate employment and earnings dynamics of single and married women over the life-cycle and build a structural model to study the roles of fiscal policies in accounting for their behavior. We show that eliminating spousal deductions, social insurance premium exemptions and survivors' pension benefits for low-income spouses would significantly raise the labor supply of women and their earnings. More women would opt for regular jobs rather than contingent jobs, accumulate more human capital, and enjoy higher income growth. The government would collect higher net revenues and there is a welfare gain when additional taxes are transferred back.

Keywords: Female labor force participation, life-cycle, human capital accumulation, spousal deductions and exemptions, survivors' pension benefits, two-tiered employment system, Japan.
JEL Classification: D15, H2, H31, J22, J24

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1 Introduction

Japan ranks 118th among 148 countries according to the Global Gender Gap Report of 2025. Japan has reached parity on education and health, but a large disparity remains between the genders, in particular when it comes to economic participation and political empowerment. The rate of women's participation in the labor force is significantly lower than that of men, but this gap is comparable to those present in other countries. However, a large fraction of women work on irregular or contingent jobs, and their average earnings are significantly lower than those of men.

Why do women work the way they do? This paper uses panel data and examines the labor market experience of women born in the 1960s over their life-cycle. We build a structural life-cycle model to account for their behavior and investigate the roles of fiscal policies in shaping the pattern of their employment and earnings.

When men and women enter the labor market, there is no significant difference in the pattern of employment types, or earnings between them. Both men and women in their 20s have high participation rates, and their earnings are not extremely different, but they start to diverge quickly as they age and careers progress. An important feature of the Japanese labor market is its two-tiered employment system, which consists of regular, and contingent employment. On average, regular jobs are more stable, and pay much more than contingent jobs. Contingent jobs are typically characterized by a fixed-term contract, which includes part-time and temporary workers.[1] A large number of women exit the labor force when they reach typical marriage and child-bearing ages, and if they return to work, most of them do so as contingent workers, even if they were on a regular job prior to the exit. The average earnings of contingent workers are not only lower than those of regular workers, but also very flat over the life-cycle. The profile shows little potential for income growth with experience, and contributes to a large gender gap in earnings.

The level of earnings also affects how women contribute to the social insurance system, which provides public pension, health, and long-term care insurance benefits to all citizens. The insurance premiums that individuals pay to the government depend on their marital status and earnings. Dependent spouses are exempted from the payment of all premiums provided that they do not earn more than a threshold amount of 1.3 million yen.

Dependent spouses with low income are also eligible for survivors' pension benefits after the death of a main earner. Moreover, individuals, in most cases husbands, also receive spousal deductions from income taxes if their spouses do not earn more than a

[1] Contingent jobs are also more susceptible to layoffs. Firms typically respond to business cycle fluctuations by adjusting the number of contingent workers. See, for example, Yokoyama et al. (2021) and Kikuchi et al. (2021) for episodes of labor market adjustments during the financial crisis and the COVID-19 crisis, respectively. Regular jobs are often considered as life-time employment and associated with a seniority-based wage system.

cutoff level. Not surprisingly, empirical studies identify that many women adjust their labor supply so their earnings do not exceed these cutoffs.[2]

We build a structural model populated by heterogeneous agents, and evaluate how these fiscal policies affect women's labor supply, focusing on the roles of three policies: spousal deductions, insurance premium exemptions, and survivors' pension benefits. We let single and married women at different stages of the life-cycle choose the participation, as well as the types of employment, regular or contingent. They evaluate consequences of their work decisions on income and consumption of a household, and taxes they owe, not only in the current period, but for the rest of their life. They also consider how their earnings, as well as their spouses', affect pension benefits after retirement. Women accumulate human capital on the job, and the growth of earnings depends not only on their age, education levels, and current employment, but also on the employment decisions they make over their life-cycle.

Our structural model is calibrated using the Japan Panel Survey of Consumers (JPSC) data. We follow a cohort of women born in the 1960s, and parametrize the model to account for their employment patterns. Our experiments demonstrate how these women would have behaved under alternative policies.

Main results are summarized as follows. The removal of the three policies raises the participation rates and earnings of women, but the effects vary across policies, both quantitatively and qualitatively. The average participation rates of women aged 25 to 64 rise by 4.8, 5.0, and 0.5 percentage points, if we remove spousal income tax deductions, social insurance premium exemptions, and survivors' pension benefits, respectively. The average earnings of women increase by 9.3%, 17.8%, and 3.3%, respectively.

The removal of the first two policies causes a rise in the participation rates by a similar magnitude, but the effects on the average earnings are very different. Without spousal deductions, a large number of women choose to participate, but they continue to keep their earnings at a lower level to avoid the payment of social insurance premiums, which amount to around 15% of their earnings.[3] Therefore, a rise in the participation rates is entirely due to an increase in the number of low-income contingent workers, which results in a smaller change in earnings compared to the removal of exemptions from payment of social insurance premiums. The latter causes women to shift from contingent employment or nonparticipation to regular employment, which generates a large increase in their average earnings as they accumulate more human capital during regular employment. Although policy changes raise the tax burden on women under all policy experiments, the higher earnings of more productive women raise the average consumption and improve welfare when additional net revenues are transferred back to them.

[2]See, for example, Yokoyama (2018), Abe and Oishi (2009) and Akabayashi (2006).

[3]It is the sum of employee portions of premiums for public pension (9.15%), health insurance (5%) and long-term care insurance (0.9%) as of 2021. Rates vary over time as explained in section 4.

Our findings suggest that there is considerable scope to improve women's participation and earnings by removing the fiscal policies that create disincentives to work. Moreover, the government could raise more tax revenues without generating a welfare loss.

This paper contributes to two lines of literature. Firstly, it is a contribution to the growing literature that builds a structural model of families to study the effects of fiscal policies on the labor supply of women. Secondly, it builds on the literature that investigates macroeconomic issues and redistributive policies in an aging economy. Japan is a country that faces the largest gender gap among the developed countries, with the most rapidly aging demographics and severe labor shortages.

There is a consensus confirmed in the first line of literature that it is important to consider household structures in analyzing individual members' life-cycle behavior, as well as the evolution of the macroeconomy and the roles of fiscal policies. Many papers build structural life-cycle models to investigate the determinants of women's labor supply and earnings. Attanasio et al. (2008) analyze the participation and saving of married women, and emphasize the role of childcare costs. Eckstein and Lifshitz (2011) examine the contribution of various factors, including education and the gender wage gap, in accounting for the historical changes in the female labor force participation. Fernandez (2013) studies the role of culture and social norms, and Greenwood et al. (2016) investigate the effects of technological changes.[4]

Recent papers that focus on the effects of policies using a model with a household structure include Borella et al. (2023), Guner et al. (2012) and Bick and Fuchs-Schundeln (2017) on the effects of joint income taxation, Voena (2015) on the role of divorce laws, and Nishiyama (2019), Kaygusuz (2015) and Sánchez-Marcos and Bethencourt (2018) on spousal and survivors benefits in the social security system.[5] Gao (2025) studies the effects of a change in the social security eligibility age in China, and Blundell et al. (2016) investigate the effects of welfare programs on women's employment and human capital in the U.K.

Our quantitative model is closest to that of Borella et al. (2023), who study the effects of joint taxation and social security's survivors' pension benefits in a unified framework. Both papers build a full life-cycle model in which individuals marry, have children, and accumulate human capital as well as physical capital, going through phases of work and retirement. In our model, we also include fixed skill heterogeneity and estimate the human

[4]See also Doepke and Tertilt (2016) for a comprehensive review of the literature, Jones et al. (2015) on the gender wage gap, Fernandez and Wong (2014) on marriage market and divorce probabilities, and Eckstein et al. (2019) on the wage and employment gap in a model with endogenous education, marriage, and fertility decisions.

[5]Gayle and Shephard (2019) and Kleven et al. (2009) study optimal income taxation of couples. De Nardi et al. (2025) study the effects of income support programs in the U.K. under the alternative specifications of a wage process. Groneck and Wallenius (2021) analyze the effects of the U.S. social security system on married women's labor supply and inequality.

capital accumulation processes for women of different education levels. Our model is also tailored to the two-tiered employment system in Japan, by distinguishing between regular and contingent jobs, and women's choices of employment types. The stock of human capital varies according to an individual's experience of regular and contingent jobs, and the paper shows that policies have important effects, not only on participation decisions, but also on the job choices of women over their life-cycle. The latter is critical in accounting for the stagnant income growth of women in Japan.

Our analysis can also be applied to evaluations of fiscal policies in other countries that treat earnings of low-income jobs differently from those of regular jobs, rendering the labor market stratified, perhaps unintentionally. For example, workers engaged in low-paying jobs known as mini-jobs in Germany, which pay no more than a threshold amount of 450 euros per month, are exempt from labor income taxes and social security contributions. Some empirical studies demonstrate that the introduction of the Mini-jobs increased labor supply at the extensive margin, but not at the intensive margin, and raised income inequality across workers.[6]

There are recent papers that build a structural model to study the effects of fiscal challenges in Japan, and emphasize the importance of a change in its labor force, driven by rapidly aging demographics and declining fertility rates.[7] Most of the papers in the literature abstract from a household structure, and do not distinguish between men and women, or between singles and married couples.

There are a small number of papers that explicitly model a family in a life-cycle model, and place emphasis on the importance of women's labor supply. İmrohoroğlu et al. (2016) consider various policy options to reduce government deficits, and argue that a rise in female labor force participation is one of the quantitatively important factors to achieve fiscal sustainability. Fukai et al. (2025) build a model of single and married individuals and study the roles of health insurance and welfare programs. Kitao and Mikoshiba (2020) use a general equilibrium life-cycle model to show that Japan's fiscal burden will be mitigated not simply by the increased participation of women, but also by closing the gender gap in wages and employment types. All these papers assume that the labor supply and earnings are exogenous. This study makes a contribution to the literature by modeling the decisions of single and married women regarding labor force participation, employment types, and human capital accumulation, in addition to consumption and savings. We also show that it is critical to distinguish between the employment types, and to consider the marital status heterogeneity in explaining the life-cycle patterns of

[6]See, for example, Haywood and Neumann (2021) and Tazhitdinova (2020) for studies about the effects of the Mini-job policy on the labor market outcomes. Carrillo-Tudela et al. (2021) analyze flows of employment in the German labor market and argue that although the introduction of the Mini-jobs increased participation rates, many formerly unemployed individuals accepted low-paid part-time jobs and income inequality increased.

[7]See, for example, Hansen and İmrohoroğlu (2016), Braun and Joines (2015) and Kitao (2015).

female labor force participation.

Our structural model enables us to evaluate the effects of various fiscal policies, and quantify how women's labor supply and life-time earnings would respond. By including these additional dimensions of heterogeneity among women, we are able to quantify the effects of the subtle details of policies, which we find crucially influence women's labor supply and skill accumulation decisions. We focus on the behavior of a particular cohort, and do not explicitly consider issues of demographic aging and fiscal sustainability in the future. However, our results suggest that alternative policies could potentially mitigate a severe labor shortage and fiscal challenges that Japan will face over the coming decades. This investigation is left for future research.

We also note that there is a large body of empirical literature that studies the effects of fiscal policies on female labor supply in Japan, and our study is complementary to papers that focus on the roles of spousal deductions and social insurance policies on dependent spouses. For example, Akabayashi (2006) and Bessho and Hayashi (2014) investigate the effects of spousal deductions on the labor supply of married women. Yokoyama (2018) and Sakata and McKenzie (2005) examine the effects of a change in the spousal deduction policy in 2004.[8] Yamada (2011) estimates a structural life-cycle model and studies the effects of income tax reforms in the 1990s.

In the context of the literature focused on Japanese women, Yamaguchi (2019), who builds a structural life-cycle model to study the role of parental leave policies on married women's labor supply and fertility, is perhaps closest to ours. We both endogenize women's decisions of participation and employment types, and allow them to accumulate human capital over the life-cycle. However, our paper focuses on the effects of income taxation and social security policies. Therefore, we use a full life-cycle model of women who transition across marital statuses, and from working to retirement phases. As such, our model includes both single men and women, married couples, and working-age individuals and retirees. We also let households choose not only labor supply and employment types, but also consumption and saving over the life-cycle, and allow for channels through which the financial security of the households after retirement influences the behavior of working-age individuals.[9]

The rest of the paper is organized as follows. In section 2, we describe our data sources and discuss the labor market experience of women over the life-cycle. In section 3, we present our quantitative life-cycle model, and section 4 describes the parametrization of

[8] Yokoyama (2018) also studies how the policy change affects the labor supply of women at different income levels. In addition to the papers cited above, there are a number of empirical papers written in Japanese that examine the effects of deductions and social insurance policies on women's labor supply. Just to name a few, see, for example, Yokoyama and Kodama (2016), Mori and Urakawa (2009), Abe and Ohtake (1995), and Higuchi (1995).

[9] Yamaguchi (2019) also models women's decisions to conceive and give birth and to take up parental leave, which we abstract from and assume exogenous in our model.

the model. Section 5 presents numerical results, and section 6 presents the concluding remarks.

2 Employment, Earnings, and Fiscal Institutions

2.1 Two-tiered Labor Market in Japan

The main data source of our analysis is the Japan Panel Survey of Consumers (JPSC), a longitudinal survey of Japanese women and their household members. The survey began in 1993 with 1,500 women aged 24-34, and additional cohorts have been added every five years. We focus primarily on the survey's first cohort A, consisting of women born between 1959 and 1969, whose information is available through 2018, when they are aged 49-59. This yields approximately 19,500 person-year observations.[10]

The JPSC provides rich information on women's labor market experience and their family members. In addition to basic information such as earnings, work hours, and educational attainment, the survey records employment type, social insurance category, employment history prior to survey entry, and the presence and age of dependent children. Its panel structure allows us to trace employment transitions and earnings dynamics over the life cycle.

A key feature of the dataset is the distinction between regular and contingent employment. This distinction is central to understanding wage and employment dynamics in Japan. Japan's labor market is widely characterized as a dual or two-tiered system that sharply differentiates regular (*seiki*) and contingent (*hiseiki*) workers in terms of job security, wages, training opportunities, and career mobility. Regular workers are typically embedded in internal labor markets and characterized by long-term employment relationships, seniority-based wage progression, and firm-sponsored training. In contrast, contingent workers, which include part-time, temporary, fixed-term, dispatched, and contract employees, receive lower wages, have limited access to internal career ladders and human capital accumulation, and face substantially weaker employment protection.

Although overall job mobility in Japan is lower than in countries such as the U.S., mobility and employment stability differ markedly across employment types. Long-term employment and seniority-based wage systems provide substantial stability for regular workers, but these features are generally absent for contingent workers. While the share of regular employment has declined over time, separation rates and earnings volatility among regular workers remain relatively low and stable.[11]

[10] See the online appendix for further details on the data. We also verify that participation rates and earnings profiles are broadly consistent with those computed from other widely used datasets, such as the Employment Status Survey (ESS). Consistent with the model presented in the next section, we restrict attention to single and married women and exclude divorced singles.

[11] Ono (2010) reassesses the lifetime employment system in Japan and shows that although it was never

This dual structure reflects persistent structural segmentation rather than cyclical fluctuations. Kambayashi and Kato (2017) document the stability of long-term employment relationships, particularly among prime-age male regular workers. By contrast, entry into contingent employment often leads to persistent disadvantage. Genda et al. (2010) show that cohorts entering the labor market during recessions experience long-lasting earnings and career penalties, partly because initial placement into non-regular employment limits subsequent transitions into stable regular positions. Asano et al. (2013) further argue that strict dismissal regulations for regular workers increase the cost of employment adjustment, encouraging firms to rely on non-regular workers as a flexible margin.

The two-tiered labor market has important macroeconomic and distributional implications. Contingent employment is disproportionately concentrated among women, linking labor market segmentation to gender inequality and household income dynamics.[12] Japan's dual labor market structure affects wage dynamics, human capital accumulation, and aggregate productivity, and has become a central feature in discussions of structural reform. OECD (2019) explicitly characterizes Japan as a dual labor market, emphasizing the persistent wage gap between regular and contingent workers and the low transition rates from contingent to regular employment.

Despite the importance of this distinction, there is no single formal definition of regular and contingent employment, and definitions vary across surveys and institutional contexts. Broadly speaking, regular employees are typically hired directly by firms on open-ended contracts, work full-time, are expected to accept job reassignment within the firm, and are covered by employer-sponsored social insurance programs, with employers making mandatory contributions on their behalf.

Contingent workers may share some of these characteristics but not all. They include part-time workers, fixed-term workers, dispatched workers employed through agencies, and contract or entrusted employees. Importantly, the distinction between regular and contingent employment is not simply based on hours worked. Some contingent workers work hours comparable to those of regular workers, whereas others work substantially fewer hours. In addition, contingent workers are less likely to be covered by employer-based social insurance and typically earn substantially lower wages.[13]

To illustrate the empirical relevance of the employment type, we use the JPSC to compute earnings and wages for women in regular and contingent employment. Figure 1a shows that regular workers earn substantially more than contingent workers. Earnings of regular workers rise steadily over the life-cycle, reflecting the seniority-based wage progression, whereas earnings of contingent workers exhibit little growth and remain flat.

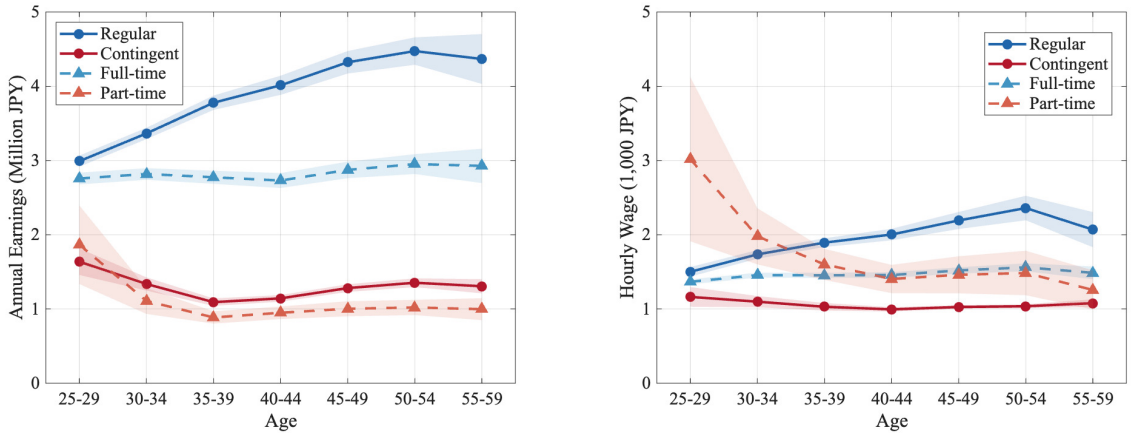
universal, long-term employment practices remain highly concentrated among male regular workers in large firms.

[12]For example, Abe (2011) documents how tax incentives, social security rules, and household considerations interact with women's contingent employment decisions, reinforcing segmentation.

[13]See Asao (2011) for a detailed description of the employment types and Japan's employment system.

Figure 1b presents average wage profiles with 95% confidence intervals, and shows a similar pattern.

For comparison, we also classify workers by hours worked, using 20 hours per week as the threshold to distinguish between full-time and part-time workers. While full-time workers earn more than part-time workers, both earnings profiles are relatively flat over the life-cycle as shown in Figure 1a. Moreover, the wage profiles of part-time and full-time workers are nearly identical, except at younger ages where the number of part-time observations is small. The earnings gap between full-time and part-time workers is therefore largely attributable to differences in hours worked rather than differences in wage growth. This comparison highlights the importance of modeling employment type, rather than hours alone, in analyzing labor market behavior in Japan, particularly for women.



(a) Earnings

(b) Wages

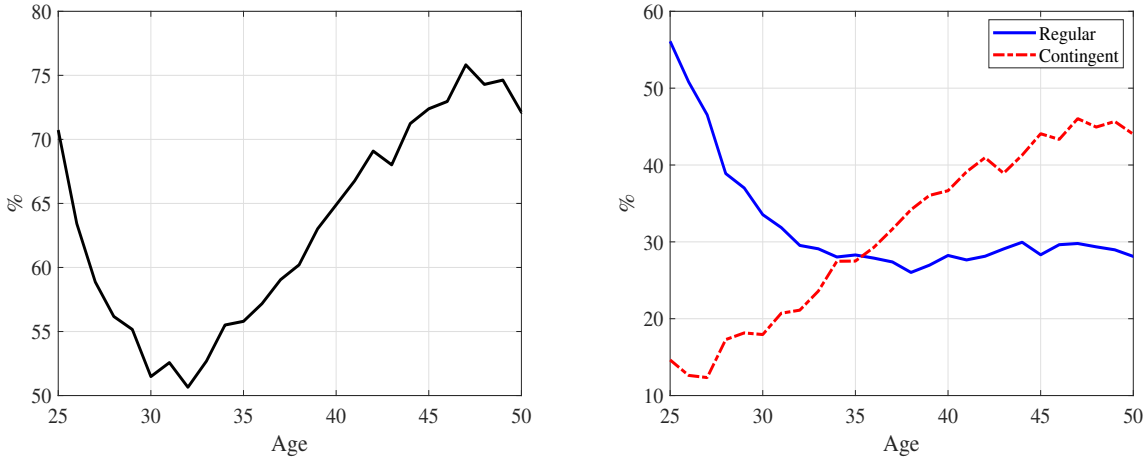
Figure 1: Earnings and Wages of Regular, Contingent, Full-time and Part-time Female Workers: JPSC Data

2.2 Labor Market Experience of Women

Based on the two-tiered labor market in Japan as described in the previous section, we group women into three employment statuses: regular, contingent and not-in-labor-force (NILF), based on the employment-status categories reported in the JPSC. Regular employees include those who answered that they are regular workers (*seishain*), and contingent employees are those who answered otherwise, including part-time workers, and temporary or contract employees.[14] We classify women as high-skilled if they have a college degree, and low-skilled otherwise.

[14]See the online appendix for more details about categorization based on the JPSC data. We exclude self-employed workers and those who work at home.

Figure 2a shows the labor force participation rates of women over the life-cycle.[15] Participation rates decline sharply from above 70% at age 25 to around 50% in their early 30s. The rates recover gradually thereafter to reach 75% in their late 40s, and stay at that level. Figure 2b shows the decomposition of participation rates into regular and contingent employment. The majority of women start their career as regular workers, but the share declines sharply from about 55% at age 25 to less than 30% in their early 30s, and unlike the overall participation rates, does not recover thereafter. The share of contingent workers increases monotonically from around 10% to above 50%, and drives the recovery of average participation rates after their 30s.



(a) Total (Regular+Contingent)

(b) By Employment Type

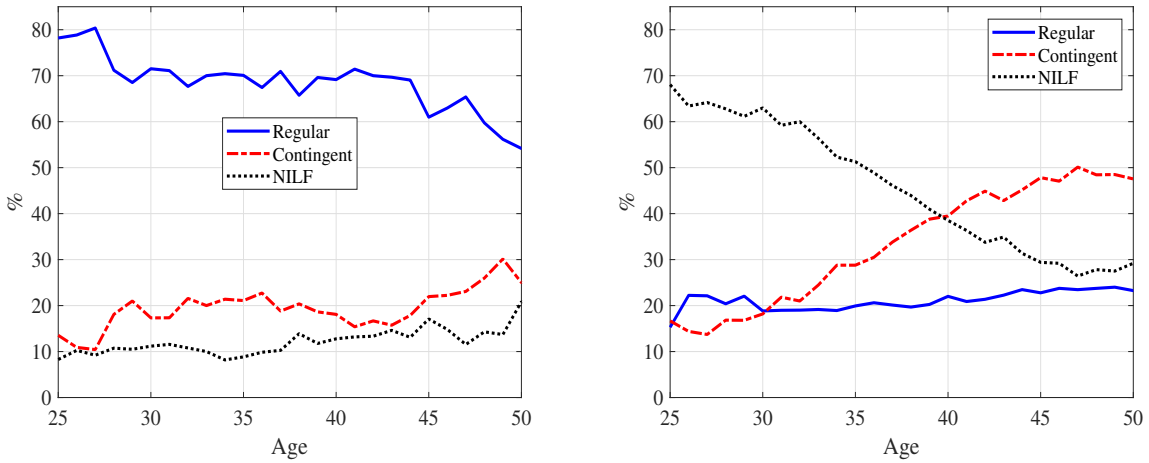
Figure 2: Women's Labor Force Participation Rates: JPSC Data

Another important dimension of heterogeneity in accounting for the life-cycle patterns of women's labor supply is marital status. According to our JPSC samples, a majority of the women get married in their 20s, and the share of married women rises from 35% at age 25 to above 85% by their mid-30s. Apart from women in their 20s and early 30s, the labor supply behavior of married women drives the overall pattern of female labor force participation.

Figure 3 shows the distribution of employment types by marital status. The decline in regular employment and overall participation rates in their late 20s and 30s is driven by the difference in employment patterns between single and married women. Married women behave very differently from single women. The share of regular workers is stable among both single and married women at different levels, and a decline in the share of regular workers among all women is driven by changes in employment types that occur at

[15] Women in our sample cohort are born in 1959-1969 and are aged 49-59 in 2018, the final year of the survey used in this paper. The number of observations declines after age 50, and we focus on the employment of women aged below 50.

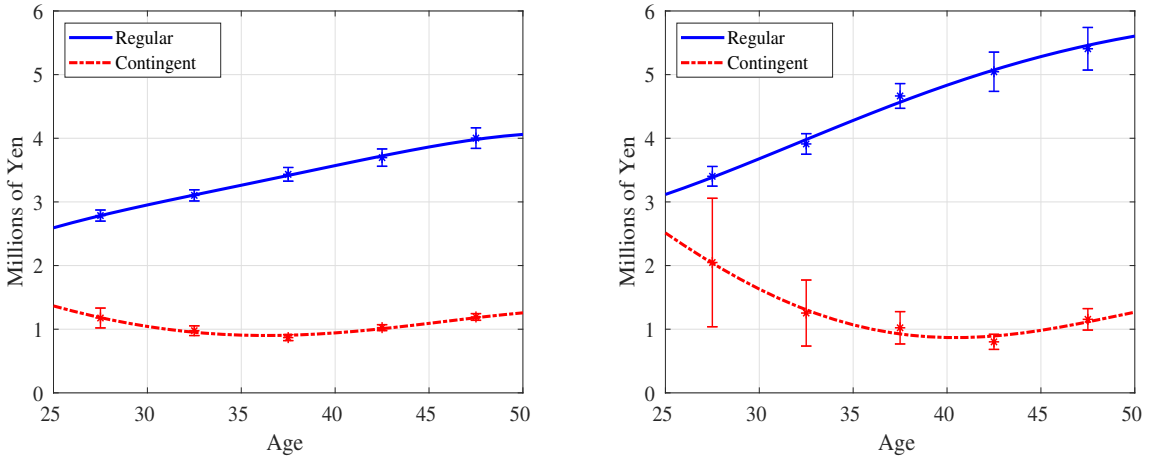
the same time as their marriage. The recovery in the overall participation rates in their late 30s and 40s is explained by the return of the married women to the labor market as contingent workers.



(a) Single (b) Married

Figure 3: Women's Participation Rates by Marital Status: JPSC Data

Figure 4 shows the life-cycle profiles of women's earnings by skill level and employment type. Regular workers earn more than contingent workers in both low- and high-skill groups. The earnings profile of contingent workers does not exhibit growth as seen among the regular workers. The earnings gap between regular and contingent workers is larger than the skill-based earnings gap conditional on employment type.



(a) Low Skill (b) High Skill

Figure 4: Women's Earnings by Skill and Employment Type: JPSC Data (With 95% Confidence Interval)

While our analysis emphasizes labor supply decisions, an important concern is whether

demand-side forces, such as firms systematically reallocating married or pregnant women from regular jobs into contingent positions, play a primary role. Although existing empirical studies for Japan do not provide direct causal evidence of such systematic firm behavior, the literature highlights structural features of the labor market that make continued employment in regular positions difficult for married women with children, due to their long working hours, limited flexibility, and rigid internal career tracks. In addition, a substantial share of housework and childcare responsibilities continues to fall on women, further constraining their ability to remain in or return to regular employment after childbirth. Firms' reliance on contingent workers as a flexible adjustment margin, documented in prior studies (e.g., Kambayashi and Kato 2017; OECD 2019; Ouchi and Kawaguchi 2018), coincides with these constraints, contributing to the observed rise in contingent employment among married women.

At the same time, there is strong empirical evidence that labor supply responds to policy distortions: earnings distributions exhibit clear bunching around tax and social insurance thresholds, indicating that many married women actively adjust hours and employment types to avoid these "walls" (Yokoyama and Kodama 2016; Kondo and Fukai 2023). In light of this evidence, our analysis focuses on the supply-side channel while taking institutional labor market features as given, with residual demand-side influences, if any, being captured in reduced form through participation costs calibrated to match observed employment patterns.

2.3 Social Insurance and Tax Policies in Japan

In this section we summarize the main features of the social insurance and tax systems in Japan, which we incorporate in the model and investigate in sections 3 to 5.

Social Insurance System: Public pension, health insurance, and long-term care insurance programs constitute the three main pillars of the social insurance system in Japan. All Japanese citizens are enrolled in the three programs, receive their benefits, and contribute to the system according to the regulations of each program.

The health and long-term care insurances provide common benefits to everyone, and cover the medical and long-term care expenditures at certain age-specific copayment rates. The public pension system consists of two parts, the "basic pension," which provides common lump-sum pension benefits for all individuals, and the "employees' pension," which depends on the contributions made through employment and is added on top of basic pension benefits.

There are three categories of insurance coverage that determine the required contributions to the system. Category-II insured are those who are enrolled in the employees'

social insurance.[16] Category-III insured are the dependent spouses of Category-II insured persons. Annual earnings must not exceed 1.3 million yen for someone to be Category-III insured.[17] Category-I insured persons include self-employed persons, students or those not in labor force, as well as employed individuals who are neither Category-II or Category-III insured.

Category-II insured individuals pay premiums for pension, health, and long-term care insurance, at a fixed rate of their earnings up to an earnings cap. Employers pay half of the contribution and employees pay the other half. As of 2021, the pension premium rate is 18.3%, and the premium rates for health and long-term care insurance are 10.0% and 1.8%, respectively, shared equally by the employer and the employee.[18]

Category-I insured individuals pay a fixed premium for the public pension program, and contributions to health and long-term care insurance at fixed rates of their earnings, comparable to those paid by the Category-II insured individuals. Category-III insured people make no contribution to any of the three insurance programs. This exemption of social insurance contributions for dependent spouses was introduced in 1985. [19]

Pension benefits after retirement consist of two parts, basic pension benefits that are common for all individuals, and employees' pension benefits that depend on the amount of contributions an individual makes as a Category-II insured worker. When a Category-II insured spouse dies, his or her surviving spouse can be entitled to a maximum of 75% of the employees' pensions of the deceased, through the survivors' pension system.

Labor Income Tax and Spousal Deductions: Labor income taxes in Japan are progressive and consist of national and local taxes. Earnings are non-taxable up to 1.03 million yen and thereafter, marginal tax rates rise from 5% to 45%. Moreover, individuals can receive income tax deductions for a dependent spouse. The maximum deduction amount varies over time and was 380,000 yen until 1987, 760,000 yen between 1987 and 2003, and back to 380,000 yen in 2004 and thereafter.[20] As of 2021, a full amount can

[16] More details about the social insurance coverage at work are provided in the online appendix.

[17] 1.3 million yen corresponds to 56.4% of average earnings of women aged between 25 and 49 in our JPSC sample shown in Figure 4.

[18] These rates vary over time and also slightly differ across the employee insurance groups. The rates we use for health and long-term care insurance are those of the Japan Health Insurance Association (JHIA), the largest employees' insurance group in Japan.

[19] Prior to 1985, it was an option for housewives to enroll in the public pension system but not mandatory. The introduction was intended to support full-time housewives, who are not able to enroll in the social security system with their own income. The introductions of the survivors' pension benefits and spousal tax deductions date back to 1948 and 1961, respectively.

[20] Note that the spousal deduction can also be lower or none if an individual's own earnings exceed a cutoff, though the cutoff is typically well above the average earnings and there are not many individuals who lose deductions by earning more than the threshold. As of 2021, a maximum of 380,000 yen can be deducted provided that an individual's own earnings do not exceed 9 million yen, and the deduction amount declines to zero in steps with a rise in earnings.

be deducted if the earnings of a spouse do not exceed 1.5 million yen, and the deduction amount declines with the spouse's earnings, reaching zero if a spouse earns more than 2.01 million yen.

To summarize the information in this section, there are multiple cutoff levels of earnings at which effective marginal taxes on labor income are extremely high, giving married women strong disincentives to work and earn beyond a threshold amount. At the margin, a married woman and her household gain significantly more by keeping the earnings below threshold levels: below 1.3 million yen to satisfy the eligibility of a Category-III insured person, and avoid the payments of social insurance premiums, below 1.03 million yen not to pay labor income taxes, and below 1.5 million yen to receive full spousal deductions.[21] Empirical studies such as Yokoyama (2018) and Abe and Oishi (2009) demonstrate that many women intentionally control their labor supply to avoid hitting these "walls." In the next section, we present the structural model that we use to evaluate the role of these policies in shaping labor supply and earnings of women.

3 Model

We build a quantitative life-cycle model populated by single men and women, and married couples. Our focus is on the behavior of women, who optimally choose participation and employment types, and accumulate human capital as they go through stages of the life-cycle, including marriage, childbirth, retirement, and the death of her spouse and her own. It is a partial equilibrium model, and individuals take the paths of factor prices and various policies as given.

3.1 Demographics

Individuals enter the economy at age $j = 1$, and live up to a maximum age of J. j^R denotes a retirement age, when all individuals leave the labor force and start receiving social security benefits. $g = \{m, f\}$ denotes a gender. We assume that individuals start facing mortality risks once they reach a retirement age, and $\mu_{j,g}$ represents the conditional probability that an individual of age j and gender g survives until the next period.

Marital status is denoted as $q = \{S, M\}$, single and married, respectively. At age $j = 1$, individuals enter the model with an initial marital status, and a single individual of age j, gender g, and skill s becomes married with probability $\xi_{j,g,s}$. Upon marriage, an individual of gender g and skill s is matched with a spouse of skill s' with probability $\pi_g(s, s')$, which takes into account the marital sorting.

[21] The amount of standard and "special" spousal deductions, and the cutoff levels have changed over time. The details, which we incorporate in our quantitative analysis, are provided in the online appendix.

For simplicity, we assume that an individual is married to a spouse of the same age, and abstract from divorce and remarriage after separation by death. Married individuals are separated from their spouse only by death.[22]

An indicator variable $i_k \in \{0, 1\}$ denotes the presence of a small child in a married household, and it affects the women's cost of participation as discussed below.[23] The state evolves stochastically and $\pi^k_{j,s}(i_k, i'_k)$ denotes a probability that a state of a couple of age j and a wife's skill s transits from i_k to i'_k in the next period. $\pi^{k0}_{j,s}(i_k)$ denotes a probability of i_k in the first year of marriage.

3.2 Endowment

Each individual is endowed with skill $s = \{L, H\}$, which is fixed throughout the life-cycle. We assume that men supply labor inelastically and their earnings are denoted as y_m, which differ by age and education, and evolve deterministically over the life-cycle.

The employment status of a woman is denoted as $e = \{R, C, N\}$, where R and C represent employment in regular and contingent jobs, respectively, and N is a state of not-in-labor-force (NILF). The earnings of a female worker are defined as

$$y_f = h \cdot hr_e, \tag{1}$$

where h denotes a worker's human capital and hr_e represents total work hours. We assume that regular workers must work a fixed number of hours and hr_R is exogenously given. Contingent workers can endogenously choose work hours hr_C, whereas hours for those not in labor force are zero, $hr_N = 0$.

Human capital evolves with an individual's work experience, and also depends on current and previous employment status, and their skill levels, represented as

$$h = f^h(s, e, e_{-1}, \mathbf{x}). \tag{2}$$

e and e_{-1} denote current and previous employment, respectively, and $\mathbf{x} = \{x_R, x_C, x_N\}$ is a vector of work experience, which consists of the number of years of employment at a regular job, x_R, a contingent job, x_C, and no employment, x_N.

[22] We abstract from divorce in our model because the divorce rate for the cohort that we study is relatively low. In our JPSC samples, about 10% of women have experienced divorce by age 50, which is much lower than in other countries. In the U.S., for example, about 45% of women born in 1957-64 experienced divorce by age 50, and about 25% of them are divorced at the age of 50 according to the National Longitudinal Surveys (NLSY79).

[23] We assume that only married households have children. In Japan, the share of births outside marriage has remained very low, averaging around 2% during 1980–2020 according to the Vital Statistics of the Ministry of Health, Labour and Welfare (MHLW).

3.3 Preferences

Households derive utility from individual or family consumption c and leisure l_g for $g = \{m, f\}$. The utility of a single individual is given as

$$u^S(c, l_g) = \frac{\left[c^\omega l_g^{1-\omega}\right]^{1-\sigma}}{1-\sigma},$$

and the utility of a married couple is given as

$$u^M(c, l_m, l_f) = \frac{\left[(c/\eta)^\omega l_m^{1-\omega}\right]^{1-\sigma}}{1-\sigma} + \frac{\left[(c/\eta)^\omega l_f^{1-\omega}\right]^{1-\sigma}}{1-\sigma},$$

where l_m and l_f denote the leisure of a husband and a wife, respectively. η represents consumption equivalence and varies with the family size.

Leisure time of a woman is given as follows:

$$l_f = L - home_{q,j} - hr_e - \phi_{q,e} - \chi_{e_{-1},e} - \nu_k. \tag{3}$$

L represents the total disposable time, $home_{q,j}$ denotes the time for housework that varies by marital status and age, and hr_e is work hours. $\phi_{q,e}$ denotes the participation disutility of a woman of marital status q and employment type e, evaluated in terms of lost leisure time. $\chi_{e_{-1},e}$ represents the cost of switching employment status from e_{-1} in the previous period to e in the current period. The last term ν_k represents the additional participation cost when there is a small dependent child in a household, i.e. $i_k = 1$. Leisure time for men is given as a fixed parameter $l_m = \bar{l}_m$, and also for retirees as $\bar{l}_r$.

3.4 Government

The government collects taxes on consumption, capital income, and labor income. It runs the social insurance system that consists of public pension, health insurance, long-term care insurance, and welfare transfers. All policy parameters can be time-varying as explained in section 4, but in this section we describe the policies without time subscripts to simplify the notations.[24]

Taxes: The government levies taxes on consumption and capital income at proportional rates, τ^c and τ^a, respectively. The net-of-tax gross return on capital is denoted as $R = 1 + (1 - \tau^a)r$, where r is an interest rate.

[24] In the computation, we use parameters that define policies including tax rates as in the data, and do not consider a budget balance of the government in the baseline model or under policy experiments. However, we also consider scenarios of transferring back the additional net revenues by making a lump-sum rebate, and compute welfare effects with and without tax adjustments. See section 5 for more details.

Tax on labor income is progressive and given as a function of earnings, $\tau^l(y_g)$ for singles, and $\tau^l(y_m, y_f)$ for couples. Taxes are determined based on an individual's earnings, rather than the combined household earnings, but an individual may receive spousal deductions if the earnings of his or her dependent spouse do not exceed a threshold. Therefore, we express the labor income tax of a married couple as a function of the earnings of the two members.

Public Pension, Health and Long-term Care Insurance Programs: The government operates three social insurance programs: public pension, health insurance, and long-term care insurance programs. All individuals are covered by the three programs and receive the benefits. However, they contribute to the system differently, depending on each individual's earnings and insurance category. There are three categories, denoted as $\{I, II, III\}$, and Category-II insured people are those who are covered by their employers. An individual who is a dependent spouse of a Category-II insured worker is Category-III insured, provided that his or her own earnings do not exceed a threshold level. Category-III insured individuals are not required to make any payment. All others are Category-I insured. In section 4, we explain more details about the insurance premiums that individuals of different categories must pay.

We use the distribution of insurance categories for each employment type and gender, and compute a premium payment for the three social insurance programs as $\tau^{si}(y_g, e)$, a function of earnings y_g and employment type e.

Pension benefits consist of two parts: a basic pension that is common across all individuals, and the employment-based part that depends on past employment and earnings history, according to the formula:

$$p_g = p_b + \kappa \cdot \overline{p}_g. \tag{4}$$

p_b denotes basic pension benefits. The second term is the employment-based part, and depends on the average past labor income $\overline{p}_g$ and a replacement rate κ. Only the contributions made as a Category-II insured count for $\overline{p}_g$ and it is updated recursively based on the value in the previous period, and employment type and earnings in the current period as:

$$\overline{p}'_g = f(\overline{p}_g, e, y_g). \tag{5}$$

Note that $\overline{p}_g$ is determined endogenously, depending on the employment choice of a woman over the life-cycle. For men, it is determined in the same way, but exogenously as an average of their life-time earnings for each skill type.

The government operates the universal health insurance, and the long-term care insurance programs. We denote age-dependent copay rates for medical and long-term expenditures as λ_j^m and λ_j^l, respectively. The total out-of-pocket expenditures $o_{j,g}$ are given

as

$$o_{j,g} = \lambda_j^m med_{j,g} + \lambda_j^l ltc_{j,g},$$

where $med_{j,g}$ and $ltc_{j,g}$ represent gross medical and long-term care expenditures of an individual of age j and gender g.

We express the total labor income taxes and social insurance premiums as $T^S(y_g)$ for single men and women, and $T^M(y_m, y_f)$ for married couples.

$$\begin{aligned} T^S(y_g) &= \tau^l(y_g) + \tau^{si}(y_g, e) \\ T^M(y_m, y_f) &= \tau^l(y_m, y_f) + \sum_{g=\{m,f\}} \tau^{si}(y_g, e) \end{aligned}$$

Welfare Transfers: The government also provides a transfer tr to a household to guarantee a minimum consumption level of $\underline{c}_q$, which varies by marital status q. The transfer amount is given as (6) and it is zero if disposable assets exceed $\underline{c}_q$ plus consumption taxes.

$$tr = \max\{0, (1+\tau^c)\underline{c}_q - \underline{a}_q\} \tag{6}$$

$\underline{a}_q$ denotes the disposable assets of single and married households defined as follows:

$$\begin{aligned} \underline{a}_S &= Ra + y_g + p_g - o_{j,g} - T^S(y_g) \\ \underline{a}_M &= Ra + \sum_g (y_g + p_g - o_{j,g}) - T^M(y_m, y_f). \end{aligned}$$

3.5 Problems of Households

We consider a problem of households in two blocks: a "young" group of working-age individuals and a group of "retirees." Young individuals are either single or married, and they make women's labor supply decisions as well as the consumption and saving choices. Retirees are at and above a retirement age, and they receive pension benefits, face survival risks, and choose consumption and savings. Married individuals may become single if their spouse dies.

We define value functions of six groups of individuals: young single men and women, S^m and S^f, young married couples, M, retired single men and women, $\widetilde{S}^m$ and $\widetilde{S}^f$, and retired married couples, $\widetilde{M}$.

Young Single Women: A state vector of a young single woman is given as $(j, s_f, a, \mathbf{x}, e_{-1}, \overline{p}_f)$, where j denotes age, s_f skill, a assets, $\mathbf{x}$ a vector that represents work experience, e_{-1} previous employment status, and $\overline{p}_f$ average past earnings that determine pension benefits.[25]

[25]The problems of single women and men one year before retirement are defined similarly, except that their value function of the next period is that of retirees. Their value functions are not presented here to save space, but are included in the online appendix.

$$S^f(j,s_f,a,\mathbf{x},e_{-1},\overline{p}_f) = \max_{c,a',e,l_f}\left\{u^S(c,l_f)+\beta\left[(1-\xi_{j,f,s_f})S^f(j+1,s_f,a',\mathbf{x}',e,\overline{p}'_f)+\right.\right.$$
$$\left.\left.\xi_{j,f,s_f}EM(j+1,s_m,s_f,a'+\tilde{a}',\mathbf{x}',e,\overline{p}'_f,i'_k)\right]\right\}$$

subject to

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

Earnings y_f are determined as in equations (1) and (2) and leisure is given as in (3). $\overline{p}_f$ is updated recursively according to the law of motion (5). $\tilde{a}'$ denotes the assets of a husband that a single woman is matched with if she is married in the next period. We assume that the individual knows the average assets held by their potential spouses, based on the average assets of single men by age and skill level. The expectation operator is with respect to the skill and assets of a future husband as well as the presence of a child, i'_k.

Young Single Men: A state vector of a young single man is given as (j,s_m,a), which represent age, skill, and asset, respectively. The expectation is with respect to the states of a potential spouse.[26] We assume that working-age men supply labor inelastically.

$$S^m(j,s_m,a) = \max_{c,a'}\left\{u^S(c,l_m)+\beta\left[(1-\xi_{j,m,s_m})S^m(j+1,s_m,a')+\right.\right.$$
$$\left.\left.\xi_{j,m,s_m}EM(j+1,s_m,s_f,a'+\tilde{a}',\mathbf{x}',e,\overline{p}'_f,i'_k)\right]\right\}$$

subject to

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

Young Married Couples: A state vector of a young couple is given as $(j,s_m,s_f,a,\mathbf{x},e_{-1},p_f,i_k)$. i_k is an indicator function which takes a value of 1 if there is a small child in the household and 0 otherwise.

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

[26] We assume that men know the average assets of women by skill and age and use them in the expectation of values in the next period. For other states, we assume that men expect to marry a woman who has been in a regular job, for simplicity. This assumption does not affect our quantitative results in any significant way but greatly simplifies the computation since we do not have to use the information about the distribution of women across all states to compute the expectation.

subject to

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

Retired Single Men and Women: A state vector of a retired single individual of gender $g = \{m, f\}$ is given as $(j, a, \overline{p}_g)$ and their problem is given as follows.

$$\widetilde{S}^g(j, a, \overline{p}_g) = \max_{c,a'} \left\{ u^S(c, l_g) + \beta \mu_{j,g} \widetilde{S}^g(j+1, a', \overline{p}_g) \right\}$$

subject to

$$\begin{aligned}(1+\tau^c)c + a' + o_{j,g} &= Ra + p_g + tr \\ a' &\geq 0\end{aligned}$$

Note that l_g equals $\bar{l}_r$, a fixed parameter that represents exogenous disposable time of a retiree. Pension benefits p_g are determined as a function of $\overline{p}_g$, according to equation (4).

Retired Married Couples: A state vector of a retired married couple is given as $(j, a, \overline{p}_m, \overline{p}_f)$

$$\begin{aligned}\widetilde{M}(j, a, \overline{p}_m, \overline{p}_f) = \max_{c,a'} \Big\{ & u^M(c, l_m, l_f) + \beta \Big[\mu_{j,m}\mu_{j,f} \widetilde{M}(j+1, a', \overline{p}_m, \overline{p}_f) + \\ & \mu_{j,m}(1-\mu_{j,f}) \widetilde{S}^m(j+1, a', \overline{p}'_m) + \mu_{j,f}(1-\mu_{j,m}) \widetilde{S}^f(j+1, a', \overline{p}'_f) \Big] \Big\}\end{aligned}$$

subject to

$$\begin{aligned}(1+\tau^c)c + a' + \sum_g o_{j,g} &= Ra + \sum_g p_g + tr \\ a' &\geq 0\end{aligned}$$

Note that when a spouse dies, his/her survivor may receive additional benefits, i.e. $\overline{p}'_g$ may not be the same as $\overline{p}_g$.

4 Calibration

The model period is annual. We calibrate the model to the Japanese data and our main data source is the JPSC panel data. As explained in section 2, we focus on the data of Cohort A of the JPSC, women born between 1959-1969, and their life-cycle behavior. We call them the cohort of the 1960s, and map the ages of the cohort to calendar years by taking 1964, the average birth year of the cohort, as their birth year. The cohort turns

25 years old (model age $j = 1$) in 1989, retires at 65 (model age $j^R = 41$) in 2029, and lives up to 95 (model age $J = 71$) in 2059. Some policies such as consumption tax rates, progressive labor income tax functions, and social insurance premiums are time-varying, and so we let policy parameters vary over the life-cycle of the cohort accordingly. Our model is a partial equilibrium model, and the interest rate r is exogenous and set to 2%. Table 2 summarizes the calibration of the parameters.

4.1 Demographics and Marriage Dynamics

For the calibration of survival rates $\mu_{j,g}$, we use the life table of the National Institute of Population and Social Security Research (IPSS).

Marriage probabilities $\xi_{j,g,s}$ of women by age and skill are computed based on the share of single women in each age-education group in the JPSC data who get married in the next period. Since JPSC only has information about the husbands of female samples, we use the Census data to compute the marriage probability based on the number of single and married men of the 1960 birth cohort, independent of skill levels.

$\pi_g(s, s')$, the probability that an individual of gender g and skill s is matched with a spouse of skill s', represents the degree of assortative mating. We use the JPSC data to compute the skill distribution of couples at age 50 to calibrate the probabilities. A low-skilled woman marries a husband of the same skill with a probability of 67.4% and a high-skilled woman marries a husband of the same skill with a probability of 78.7%. For men, the probability of marrying a woman of the same skill level is 95.8% and 75.0% for low and high skills, respectively.

As explained in Section 3.5, the assets of married men and women upon marriage are determined by the asset holdings of single individuals of the opposite gender. These asset profiles of potential spouses are themselves equilibrium variables. Therefore, in solving the model, we iterate on the asset distribution of single individuals entering the value functions until it is consistent with the equilibrium asset distribution determined in the model's equilibrium.

The transition probabilities of having a small child, $\pi^k_{j,s}(i_k, i'_k)$, and the probability of having a child in the initial year of marriage, $\pi^{k0}_{j,s}(i_k)$, are computed based on the number of married couples with and without a dependent child aged 0-5 according to the JPSC data.[27]

[27] Costa Dias et al. (2020) show that women's participation rates decline sharply during the first five years after childbirth using the labor market data in the U.K. Bick (2016) also shows a similar pattern in Germany and other EU countries.

4.2 Human Capital

The wages of women depend on their skill level, employment type in the current and previous periods, and work experience, and these are expressed as $h = f^h(s, e, e_{-1}, \mathbf{x})$, where $\mathbf{x} = \{x_R, x_C, x_N\}$. We use the JPSC data to estimate the process, following the method of Yamaguchi (2019).[28]

For women of each employment type $e = \{R, C\}$, we estimate the following function for log hourly wage h_{it} of an individual i at time t, which is considered as a measure of human capital in the model. We use the information about each individual's current employment, and also the past employment history. We also include unemployment rate U_t at time t to account for macroeconomic conditions that may vary and affect the level of the overall earnings.[29]

$$h_{it} = \beta_s + \beta_{e_1} x_{e,it} + \beta_{e_2} x_{e,it}^2 + \beta_{k_1} x_{k\neq e,it} + \beta_{n_1} x_{N,it} + \beta_{k_{-1}} i_{e_{-1}\neq e,it} + \beta_{N_{-1}} i_{e_{-1}=N,it} + \beta_U U_t + \varepsilon_{it} \tag{7}$$

β_s is a skill-specific intercept, and the effects of experience in regular and contingent employment are approximated by a polynomial in the number of work years in each job. $x_{e,it}$ represents the number of years that an individual i has worked in an employment type e so far as of time t. $i_{e_{-1}\neq e,it}$ is an indicator which takes a value of 1 when the individual's previous employment type is different from the current employment type e. These terms for previous employment capture an adjustment cost on human capital when an individual switches the type of employment.

Table 1 summarizes the estimation results. A positive intercept for high skill represents a skill premium, which is larger on a regular job than on a contingent job. An additional year of experience increases the earnings, though the effect diminishes over time, as indicated by a negative coefficient on squared years of experience. A switch from a contingent job or non-employment to a regular job has a negative impact on the earnings of a regular worker, relative to individuals who continue to work as regular employees. However, a shift from a regular job to a contingent job has a positive effect. We use these estimated functions to compute the earnings in the model.

[28] Yamaguchi (2019) focuses on the effects of parental leave policies, and we do not include terms that he used in his estimation related to them. Our model has heterogeneity in skills defined by education levels and we include an intercept for them.

[29] Estimated coefficients on unemployment rates are small (0.0187 for regular and −0.0426 for contingent workers) and estimates of other coefficients do not change much quantitatively.

Table 1: Estimated Log Wage Functions of Regular and Contingent Workers

	Regular		Contingent	
	Estimate	Std. err.	Estimate	Std. err.
Intercept, all	-2.1336	(0.0387)	-2.2209	(0.0391)
Intercept, high H	0.2205	(0.0152)	0.2961	(0.0189)
Reg. experience x_R	0.0195	(0.0034)	0.0013	(0.0012)
Sq. of $x_R/100$	-0.0741	(0.0913)	–	–
Cont. experience x_C	-0.0014	(0.0019)	0.0107	(0.0029)
Sq. of $x_C/100$	–	–	-0.3491	(0.1065)
NILF x_N	-0.0115	(0.0022)	-0.0096	(0.0011)
Lagged reg.	–		0.1552	(0.0285)
Lagged cont.	-0.0843	(0.0304)	–	–
Lagged NILF	-0.1227	(0.0576)	0.0182	(0.0255)

Men's earnings y_m vary with age and skill deterministically, and are estimated using data on men's earnings of the JPSC.[30] 98% of the husbands of married women in our JPSC samples participate in the labor market and we assume that men always work in our model.

In our model, women enter the economy at age 25. There is much heterogeneity in the work experience among women aged 25 in the JPSC data, as shown in Figure 5. We use this distribution as the initial distribution of past experience and human capital of women when they enter the model at age 25.

[30] See the online appendix for the estimated profiles.

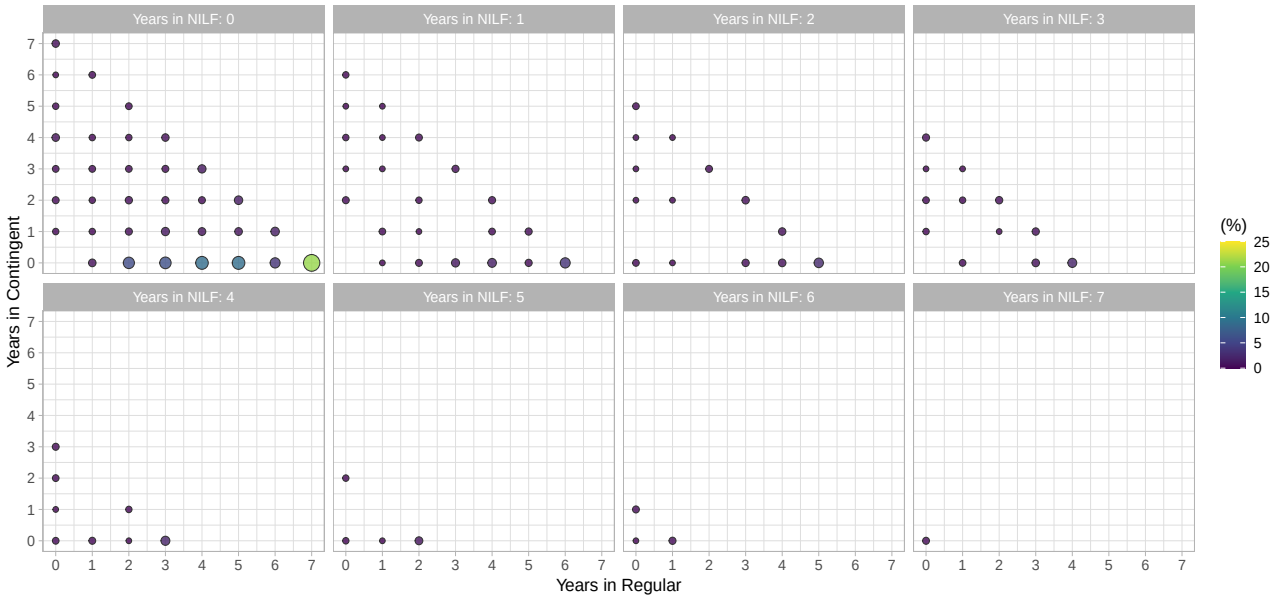


Figure 5: Initial Distribution of Women's Work Experience: JPSC Data

4.3 Preferences and Endowment

The equivalence scales η for households are based on OECD's modified equivalence scale, which assigns 1.0 for the first adult, and adds 0.5 for the second adult, and 0.3 for each additional child. We use the JPSC data to compute an average number of dependent children aged 18 and younger for a married couple at each age, and use them in the computation of equivalence scales for married households. We set the risk aversion parameter σ at 3.0, which is in the range of values used in the literature.[31] The subjective discount factor β is set to 0.98. An individual's total disposable time is normalized to 1.0.

Time for housework, $home_{q,j}$ is calibrated using the hours reported in the JPSC.[32]

Preference Parameters Calibrated in the Model Equilibrium: The parameters related to disutility from work and preference weight on leisure are calibrated to approximate life-cycle profiles of the regular and contingent employment rates of single and married women and the average work hours of women. The set of parameters includes the preference weight on leisure ω, the participation cost by employment type and marital status, $\phi_{q,e}$, the additional participation cost when there is a small child of age

[31] For example, Borella et al. (2023) set the risk aversion parameter at 2.5 and De Nardi et al. (2016) set it to 2.83, as estimated in their model. The subjective discount factor is in the range of 0.98-0.99 in these papers.

[32] The JPSC asks respondents to report their total hours spent on housework and childcare, but it does not collect hours for each activity separately. Therefore, we use the reported hours for employed women without young children to calibrate the housework hours $home_{q,j}$ by marital status and age.

0-5, ν_k, and the cost of switching employment types, $\chi_{e_{-1},e}$. We assume that there are switching costs for "upward" moves: a switch from non-employment to either a regular or contingent job, and a switch from a contingent to a regular job. In total, there are nine parameters related to labor supply and participation costs, and we calibrate them by minimizing the sum of distances between the data and the model in the employment rates of regular and contingent workers among single and married women at each age between 25 and 49, and average work hours of women.[33] The values of the parameters are summarized in Table 2.

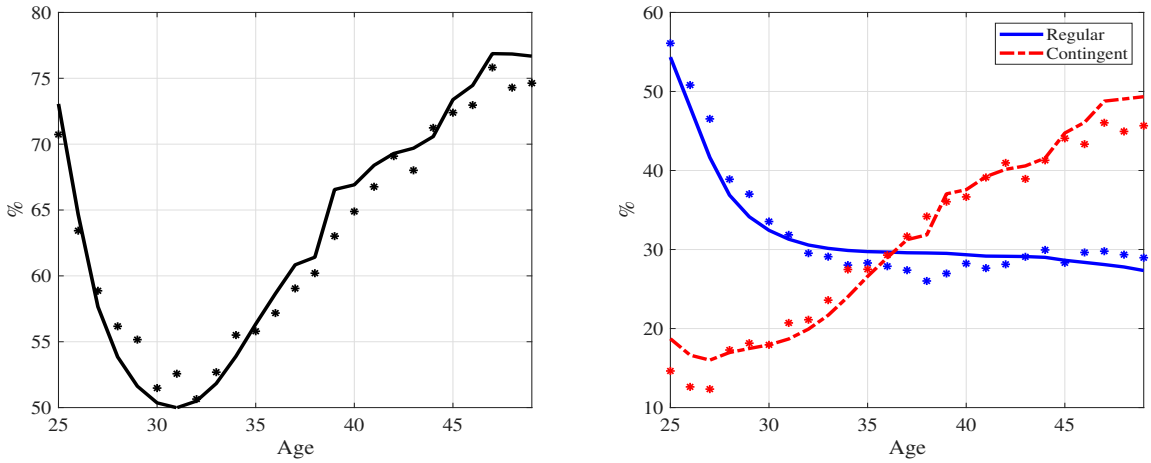
Note that the values of participation cost for married women in regular and contingent jobs are close and are, in fact, slightly lower for regular jobs. While this may appear to contradict the intuition that regular jobs require fixed and long working hours with less flexibility and therefore entail higher disutility, once both participation costs and hours worked are taken into account, the overall time cost of working remains higher for regular employment than for contingent employment. In the baseline model, the total time cost of work is $0.099 + 0.384 = 0.483$ for regular workers and $0.119 + 0.205 = 0.324$ for contingent workers on average, where 0.384 and 0.205 are attributable to the costs associated with average work hours for regular and contingent workers, respectively.

One interpretation of the overall higher participation cost associated with regular employment is that it captures the lack of flexibility and other costs of regular jobs beyond the fixed work hours assumed in the model. These costs may reflect not only workers' preferences but also labor market frictions and institutional features that are not explicitly modeled. For example, firms may strategically move married or pregnant women into contingent employment, or social norms and workplace practices may make it more difficult for women with family responsibilities to remain in regular employment. We interpret the higher overall disutility associated with regular employment as a reduced-form representation of these broader frictions that are not explicitly incorporated in our model.

Figure 6 shows women's participation rates in our model, and compares the profiles with the JPSC data, which are shown as dots. As shown in Figure 6a, the model replicates the overall participation pattern, in which an increasing number of women leave the labor force in their 20s to their early 30s, and many of them gradually return to work thereafter. This overall pattern of employment is explained by a distinctive change in the composition of women's employment types, as shown in Figure 6b, which exhibits a sharp decline in the share of regular workers, which never recovers after their early 30s, and a monotonic increase in the share of contingent workers. This pattern in the data is replicated in the

[33] We use the samples of women born in 1959-69 and data collected in 1993-2018. We chose the target employment of those aged 25-49 since by 2018 the youngest women of the cohort reach age 49 and the number of samples declines above that age. We use the share of single and married women at each age as the weights in minimizing the distance. In total, we have 101 $(25 \times 4 + 1)$ moments to target by the calibration of nine parameters.

model.

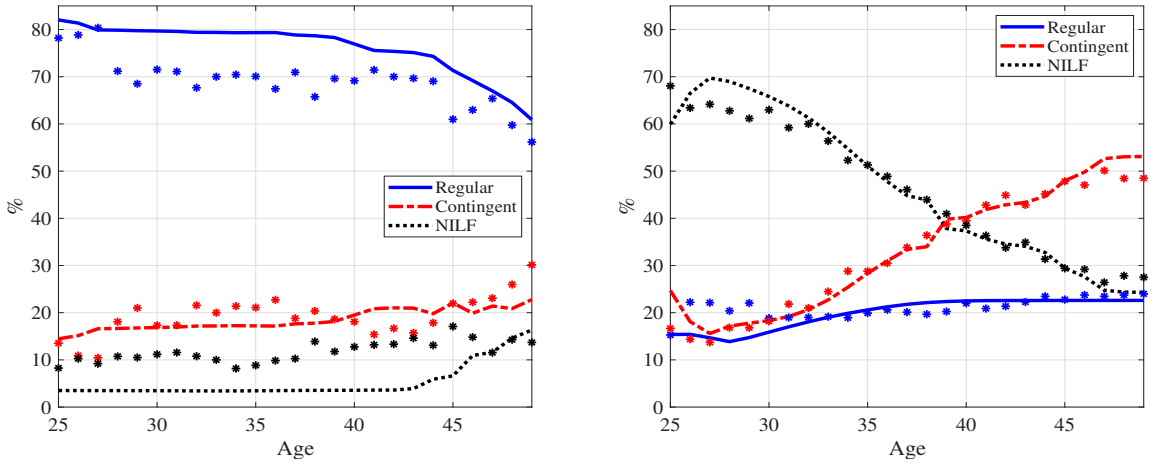


(a) Total (Regular+Contingent)

(b) By Employment Type

Figure 6: Women's Labor Force Participation Rates: Model (solid and dashed lines) and JPSC Data (circles)

Figure 7 shows employment profiles by marital status. The profile of single women, as shown in the left panel, does not show any major change until their mid-40s, unlike the profile of all women, which shows a sharp decline in the share of regular workers in their 20s, as we saw in Figure 6b. Among married women, as shown in Figure 7b, the share of regular workers stays low at around 20%, and similarly, it does not change much. The share of contingent workers increases from around 20% to 50%, while the share of not-in-labor-force declines from around 70% to 20%. The overall pattern of women's employment is driven by a large number of women switching employment types as they get married, and their subsequent return to employment as contingent workers. The average work hours of all working women are 6.98 hours in the JPSC data and it is 6.63 hours in the model.



(a) Single (b) Married

Figure 7: Women's Employment by Marital Status: Model (solid and dashed lines) and JPSC Data (circle dots)

4.4 Government

Taxes: The consumption tax rate is zero until 1988, raised to 3% in 1989, 5% in 1997, 8% in 2014, and 10% in 2020.[34] The capital income tax rate is set to 35%, which is in the range of estimates for effective tax rates on capital income as in Hansen and İmrohoroğlu (2016), for example.

The labor income tax is progressive, and marginal tax rates rise in earnings in steps. We include the basic and salary income deductions available to all employed workers, and spousal deductions for eligible workers. Spousal deductions are provided only if the earnings of a spouse are below the threshold level. The upper limit of earnings, and the deduction amount vary over time. Up until 2003, the maximum annual deduction amount is 760,000 yen, and in 2004, it is reduced to 380,000 yen. As of 2021, the maximum amount can be deducted from an individual's taxable income, provided that his or her spouse earns less than 1.5 million yen. The deduction phases out with earnings above the cutoff, and reaches zero if the earnings exceed 2.01 million yen.

The basic deduction is a fixed amount, and salary income deductions increase with the earnings. The combination of the basic deduction and the minimum employment-income deduction creates a tax-free earnings threshold of 1.03 million yen. These cutoffs for exemptions and spousal deductions are so-called "103 and 150 walls," respectively. The 1.03 million yen threshold determines when the worker begins to owe income tax, while the 1.5 million yen threshold determines when the spouse's deduction begins to phase out.

Labor income taxes consist of national and local taxes. Tax rates and progressivity

[34]More precisely, the tax rate was raised to 3% in April 1989, 5% in April 1997, 8% in April 2014, and 10% in October 2019, which we implement from 2020 in the annual model.

vary over time and as of 2021, the marginal tax rates are between 5% and 45% at the national level, and the local tax rate is proportional at 10%.[35]

Public Pension, Health and Long-Term Care Insurance: As mentioned in section 2, premiums for public pension, health and long-term care insurance, depend on the insurance categories of individuals. Category-II insured are workers who are covered by social insurance at work, and Category-III insured people are the dependent spouses of Category-II workers, subject to an earnings limit. Category-I insured are the rest of the individuals, including those not in labor force without a Category-II spouse.

We assume that all regular workers are Category-II insured, all single non-employed individuals are Category-I insured, and all married non-employed people are Category-III insured. For married contingent female workers, if the earnings exceed the threshold of 1.3 million yen, they are Category-II insured and otherwise they are Category-III insured.[36]

As shown in equation (4), pension benefits are determined as a sum of basic pension p_b and a part that depends on the average past labor income earned as a Category-II worker, $\overline{p}_g$. We set p_b at 780,900 yen and κ at 0.219, based on the pension benefit schedule of 2021.[37]

For men, $\overline{p}_m$ is computed as the average earnings for each skill type. For women, $\overline{p}_f$ is updated recursively as in (5). A part of a female worker's earnings y_f is counted as contribution to employment-based pensions, according to the fraction of women in each employment type in the JPSC data who work as Category-II insured.

Once an individual has retired, $\overline{p}_g$ remains constant as long as the marital status remains the same. When a spouse dies, an individual's pension benefits may be adjusted upwards if he or she is eligible to receive survivor's benefits. Supposing that the average past earnings that determine an income-dependent part of the benefits are given as $\overline{p}_m$ and $\overline{p}_f$, for a husband and a wife respectively, and that a husband dies and a wife survives,

[35] See the online appendix for more details about the time path of the progressive labor income taxes, spousal deductions, and basic and salary income deductions, which we incorporate in our computation.

[36] Previous studies document a pronounced spike in married women's earnings just below the social insurance threshold, suggesting that many women adjust labor supply to avoid exceeding it (Kondo and Fukai 2023; Yokoyama and Kodama 2016). In our JPSC sample, contingent workers are distributed across insurance types I (12%), II (34%), and III (47%). Our model predicts a larger share of type III workers (98.6%), likely because workers can freely adjust hours and the incentive to keep earnings below the 1.3 million yen threshold may work more strongly than in practice, where hours can be constrained by employers and labor market conditions. We also conduct policy experiments assuming that the premium payments are based on the exogenous insurance-type distribution observed in the JPSC data. The main quantitative results, including changes in labor-force participation rates, employment type, and earnings, remain largely unchanged.

[37] Note that the 1960 cohort will reach 65 in 2029, and they have not started receiving pension benefits.

the wife's $\overline{p}_f$ in the next period will be given as follows:

$$\begin{array}{lll} \overline{p}'_f & = \overline{p}_f & \text{if } \overline{p}_m < \overline{p}_f \\ \overline{p}'_f & = \frac{1}{2}(\overline{p}_m + \overline{p}_f) & \text{if } \overline{p}_f < \overline{p}_m < 2\overline{p}_f \\ \overline{p}'_f & = \frac{3}{4}\overline{p}_m & \text{if } 2\overline{p}_f < \overline{p}_m \end{array} \tag{8}$$

For example, if a husband of a never-worked wife dies, she will be entitled to 75% of her husband's employment-based pension benefits for the remainder of her life.

Data for gross medical expenditures and long-term care expenditures by gender and age are taken from the publicly available data of the Ministry of Health, Labour and Welfare (MHLW). The copay rates of health insurance vary by age and they are 30% up to 69 years old, 20% at ages 70-74, and 10% at ages 75 and above. The copay rate of long-term care expenditures is 10%.

The premiums of the public pension system depend on each individual's insurance category. Category-I insured individuals pay a fixed amount each month, and the Category-II insured ones contribute a fixed fraction of their earnings. The premium amount and the rates vary over time, and in 2021, the Category-I premium is 16,610 yen per month, and Category-II individuals pay 9.15% of their earnings.[38] Category-III insured workers are exempted from the premium payment. For health and long-term care insurances, Category-I insured individuals pay either a fixed premium if an individual does not earn, or a fixed percentage of their earnings. Category-II insured individuals also pay a fixed fraction of their earnings as premiums. See the online appendix for more details regarding the premium amount and proportional rates over time, which we use in the computation.

Welfare Program: The consumption floor $\underline{c}_q$ is set to 870,000 yen for singles and 1,320,000 yen for married couples, based on the minimum standard of living for one and two-member households.

[38]The total premium of Category-II is 18.3% of earnings, which is shared equally by an employer and an employee.

Table 2: Parameters of the Model

Parameter	Description	Value/Source
Demographics		
j^R	Retirement age	41 (65 years old)
J	Maximum age	71 (95 years old)
$\mu_{j,g}$	Survival probability	IPSS life table
$\pi^k_{j,s}(i_k, i'_k)$	Transition prob. of a small child	JPSC data
$\pi^{k0}_{j,s}(i_k)$	Prob. of a small child (initial)	JPSC data
Marital Status		
$\xi_{j,g,s}$	Prob. of marriage	JPSC data (women)
		Census data (men)
$\pi_g(s, s')$	Degree of assortative mating	JPSC data
Endowment		
$f^h(s, e, e_{-1}, \mathbf{x})$	Women's human capital	JPSC data
y_m	Men's human capital	JPSC data
Preference		
β	Subjective discount factor	0.98
σ	Risk aversion parameter	3.0
η	Equivalence scale	OECD
$\bar{l}$	Leisure time for men and retirees	0.66 ($\bar{l}_m$), 1.00 ($\bar{l}_r$)
$home_{q,j}$	Home production time	JPSC data
Preference (Calibrated in Model Equilibrium)		
ω	Leisure/consumption weight	0.603
$\phi_{q,e}$	Participation cost	0.361($\phi_{S,R}$), 0.127($\phi_{S,C}$)
		0.099($\phi_{M,R}$), 0.119($\phi_{M,C}$)
ν_k	Participation cost (a small child)	0.194
$\chi_{e_{-1},e}$	Switching cost	0.490($\chi_{N,R}$),0.286($\chi_{N,C}$),0.486($\chi_{C,R}$)
Medical and Long-term Care Expenditures		
$med_{j,g}$	Gross medical expenditures	MHLW data
$ltc_{j,g}$	Gross long-term care expenditures	MHLW data
Government		
λ^m_j	Health insurance copay	30%, 20%, 10% (varies by age)
λ^l_j	Long-term care insurance copay	10%
κ	Public pension formula	0.219
p_b	Basic pension	780,900 yen
$\underline{c}$	Consumption floor	870,000 yen (singles)
		1,320,000 yen (married)
$\tau^l(y_g)$	Labor income tax	Progressive (see text)
τ^c	Consumption tax rate	3-10%
τ^a	Capital income tax rate	35%
r	Interest rate	2%

5 Numerical Analysis

We present our numerical results in this section. We first discuss the outcome of the baseline model, focusing on women's labor force participation rates, employment choices, and earnings over the life-cycle. We then simulate policy experiments, and present how different fiscal policies affect the employment decisions and earnings of women, and influence the tax revenues and welfare.

5.1 Employment and Earnings in the Baseline Model

Figure 8 shows women's annual earnings by skill and employment type in the baseline model. The pattern is in line with the data based on the JPSC, as shown in Figure 4. Skills are harder to accumulate on a contingent job, and the life-cycle profiles are much flatter than those of regular workers. Both the composition of employment types and the difference in earnings between regular and contingent workers contribute to a larger earnings gap between men and women.

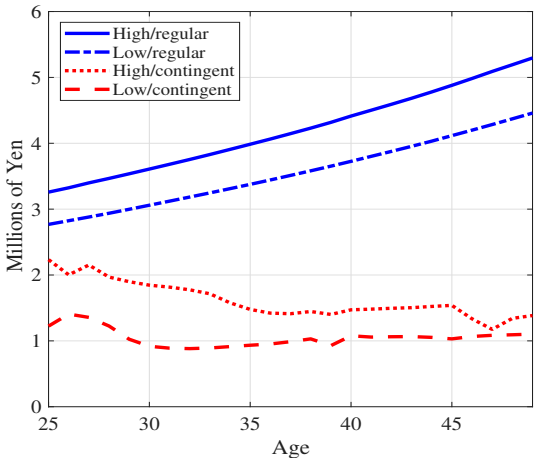


Figure 8: Women's Earnings by Skill and Employment Type: Baseline Model

5.2 Roles of Three Fiscal Policies

In this section we simulate our model under alternative assumptions about tax and social insurance policies to understand how each element of the fiscal policies affects women's labor supply and their earnings.

We focus on three policies. The first is income tax deductions for a dependent spouse, which allows an individual to claim a fixed deduction from gross earnings if a spouse does not earn more than a threshold level. The second is an exemption of social insurance premiums for a Category-II dependent spouse, provided that he or she does not earn more than 1.3 million yen. Finally, we study the effects of survivors' pension benefits that provide a surviving individual with up to 75% of the employees' pension benefits that his

or her deceased spouse was entitled to, as shown in equation (8). We simulate the model under three scenarios, in which we remove each of the three policies, one by one. The details of the three experiments are summarized as follows.

- **Exp 1:** No income tax deductions for a dependent spouse
- **Exp 2:** No exemption of social insurance premiums for Category-III insured
- **Exp 3:** No survivors' pension benefits

Table 3 shows the average participation rates of women in the baseline model, and under the three experiments. Removal of the policies increases the labor force participation of women, though the effects vary both quantitatively and qualitatively across the experiments. In Experiment 1, as shown in the second column of Table 3, the elimination of spousal deductions removes the disincentives to participate in the labor market since it no longer implies a loss of deductions from the husband's earnings. The deductions are a major obstacle to women's entry into the labor force since the effective tax rate on their earnings would be extremely high.[39]

The removal of deductions increases the average participation rate by 4.8 percentage points, from 66.6% to 71.4%. Many of them, however, still want to keep their earnings low and do not choose regular jobs so that they continue to enjoy the exemptions from social insurance taxes. In addition to labor income taxes, earnings are subject to social insurance premiums at a rate of approximately 15% once they exceed 1.3 million yen. The increase in participation comes mostly from a shift from NILF to contingent jobs, whose share rises from 38.6% to 41.3%, while the share of regular workers barely changes.

In Experiment 2, when the exemptions from social insurance premiums are removed, the average participation rate increases by 5.0 percentage points, a similar magnitude as in Experiment 1. The change, however, occurs via a very different channel. The increase comes from a shift from both NILF and contingent jobs to regular jobs, and the share of regular workers increases by 5.1 percentage points, from 28.0% to 33.1%, as shown in Table 3. Since women are no longer exempted from the social insurance premiums, and both non-working and low-income wives would have to contribute, married women have stronger incentives not to leave the labor market. If they participate, they are incentivized to earn more by taking on a regular job.

[39]The maximum deductions vary over time. They are 760,000 yen until 2003, or until they are 39 years old, and they lose the entire deductions if the earnings exceed 1.4 million yen. The loss of the spousal deduction raises the husband's income-tax liability at his marginal tax rate. In addition, once the wife's earnings exceed the social-insurance threshold, she becomes liable for employee social-insurance premiums of approximately 14-15% of earnings.

Table 3: Average Participation Rates under Alternative Policies (%): All Women Aged 25-64

	Baseline	Exp 1	Exp 2	Exp 3
Employed	66.61	71.36 (+4.75)	71.61 (+5.00)	67.12 (+0.51)
- Regular	28.02	30.06 (+2.04)	33.10 (+5.08)	29.47 (+1.45)
- Contingent	38.59	41.31 (+2.72)	38.50 (−0.09)	37.64 (−0.95)
NILF	33.39	28.64 (−4.75)	28.39 (−5.00)	32.88 (−0.51)

The change in the composition of working women leads to the higher average earnings of women. The average earnings of all women, including zeros, increase by 9.3% in Experiment 1, but by as much as 17.8% in Experiment 2 on average, as summarized in Table 4. More women accumulate human capital on a regular job, and their earnings reach a much higher level over their career. In Experiment 2, the average earnings of women aged 25-49 are 16.3% higher than in the baseline economy, and women aged 50-64 earn 19.8% more. This increase is concentrated among married women as shown in the middle panel of Table 4. There is a positive but smaller change in the earnings of single women. Both low and high-skilled women are more likely to be engaged in regular jobs, and their earnings increase by 18.8% and 12.7%, respectively.

Table 4: Average Earnings under Alternative Policies (%-Changes Relative to Baseline)

	Exp 1	Exp 2	Exp 3
All women	+9.26	+17.75	+3.30
By age group			
Age 25-49	+10.25	+16.34	+2.81
Age 50-64	+7.84	+19.76	+4.00
By marital status			
Single	+0.45	+0.95	+0.94
Married	+12.70	+24.29	+4.22
By skill			
Low	+9.78	+18.83	+2.02
High	+6.82	+12.65	+9.36

Table 5 shows further decomposition of the changes in employment rates. In both Experiments 1 and 2, a rise in participation mainly comes from an increase in the number of

working married women, and both low and high-skilled women respond to a policy change. In Experiment 3, we remove the survivors' pension benefits. The average participation rates increase, though the change is smaller than in the first two experiments. Women face a lower expected income after their husband passes away. A rise in participation comes from an increase in the number of regular workers, who, being Category-II insured, pay pension premiums and increase the employment part of their pension benefits.

Table 5: Average Participation Rates by Marital Status, Age Group and Skill under Alternative Policies (%): Women Aged 25-64

	Baseline	Exp 1	Exp 2	Exp 3
By marital status				
Single: Employed	82.45	82.52 (+0.07)	82.65 (+0.20)	82.57 (+0.12)
- Regular	60.11	60.89 (+0.78)	61.81 (+1.70)	61.82 (+1.71)
- Contingent	22.34	21.63 (−0.71)	20.84 (−1.50)	20.75 (−1.59)
Married: Employed	63.26	69.01 (+5.75)	69.27 (+6.01)	63.85 (+0.59)
- Regular	21.24	23.54 (+2.30)	27.03 (+5.79)	22.63 (+1.39)
- Contingent	42.02	45.47 (+3.45)	42.24 (+0.22)	41.21 (-0.81)
By age group				
Age 25–49: Employed	63.37	70.78 (+7.41)	71.15 (+7.78)	63.98 (+0.61)
- Regular	32.14	34.10 (+1.96)	37.07 (+4.93)	33.64 (+1.50)
- Contingent	31.23	36.68 (+5.45)	34.08 (+2.85)	30.34 (−0.89)
Age 50–64: Employed	72.01	72.34 (+0.33)	72.36 (+0.35)	72.35 (+0.34)
- Regular	21.16	23.31 (+2.15)	26.49 (+5.33)	22.54 (+1.38)
- Contingent	50.85	49.03 (−1.82)	45.87 (−4.98)	49.81 (−1.04)
By skill				
Low	64.34	69.19 (+4.85)	69.24 (+4.90)	64.68 (+0.34)
High	83.70	87.73 (+4.03)	89.38 (+5.68)	85.38 (+1.68)

Consumption and Taxes: Table 6 shows the changes in consumption under alternative policies, expressed as percentage deviations from the baseline model. Note that in the baseline policy simulations, we are not considering how additional tax revenues due to policy changes are used in the economy. Table 7 shows the changes in the amount of taxes and social insurance premiums paid by single women and married couples under the four scenarios. Not surprisingly, the average tax payment increases in all the scenarios.

Although the tax liabilities of women increase, the average consumption increases for all the groups in Experiments 1 and 2. Women participate, accumulate more human capital, and hence earn more due to their higher productivity. The positive outcomes of

a higher income outweigh the negative effects of the higher tax burden.

In Experiment 3, there is a large decline in pension benefits for widowed women with the removal of survivors' pension benefits. As more women participate as regular workers, their own pension benefits increase, but their earnings are still much lower than those of men. Moreover, the policy change reduces the benefits they receive after the death of a spouse, and their consumption is lower than in the baseline model. As shown in Table 8, the pension benefits of single women are much lower than in the baseline.

Table 6: Consumption under Alternative Policies (%-Changes Relative to Baseline)

	Exp 1	Exp 2	Exp 3
All	+1.10	+2.45	−0.24
By Age Group			
Age 25-64	+1.48	+2.89	+0.20
Age 65-95	+0.51	+1.75	−0.93
By Skill (age 25-64)			
Low	+1.45	+2.86	−0.13
High	+1.64	+3.12	+2.25
By Marital Status and Age			
Single (25-64)	+0.37	+0.77	+0.77
Single (65-95)	+0.41	+0.60	−9.71
Married (25-64)	+1.67	+3.25	+0.11
Married (65-95)	+0.53	+2.05	+1.32

Note: Average consumption levels are computed as an average of consumption at each age over relevant ages.

Table 7: Tax and Social Insurance Premiums Paid by Women Aged 25-64 (%-Changes Relative to Baseline)

	Exp 1	Exp 2	Exp 3
All	+6.83	+15.79	+1.21
By Skill			
Low	+7.12	+16.54	+0.68
High	+5.17	+11.33	+4.37
By Marital Status			
Single	+0.47	+0.96	+1.03
Married	+7.37	+17.03	+1.23

Table 8: Pension Benefits (%-Changes Relative to Baseline)

	Exp 1	Exp 2	Exp 3
All	+0.83	+5.37	−5.39
By Marital Status			
Single	+0.24	+1.14	−9.97
Married	+2.28	+7.24	+0.72

Welfare Effects with and without Tax Rebate: Table 9 shows the welfare effects of the three scenarios. These are measured as the consumption equivalence variation, which represents a percentage change in consumption across all possible states in the baseline economy so that an individual would be indifferent between the baseline economy and an alternative economy under each experiment.

The top panel, "Without Tax Rebates," shows the consumption equivalence based on our simulations presented above, where women pay higher taxes and social insurance premiums following the policy change, but the additional revenues are not returned to them. The lower panel, "With Tax Rebates," shows the results when the additional revenues collected from single and married women are rebated to them through transfers that increase consumption in every possible state by the same percentage. The transfer is computed so that it raises consumption by an identical percentage across all households with women while exactly exhausting the additional tax revenues collected. Thus, it is not a lump-sum transfer and the transfer amount differs across households because it is proportional to their consumption, in the same way that the consumption equivalence is

computed.

The removal of each policy uniformly imposes an additional financial burden and lowers welfare, even if more women earn a much higher income. Among the three experiments, the welfare loss is the largest under Experiment 2. The average loss is 2.1% in consumption equivalence, and in this case, the low-skilled women lose by much more. A larger fraction of low-skilled women work in contingent jobs in the baseline economy, enjoying the exemptions from insurance premiums, and are hit harder by the removal. The negative welfare effects are not surprising since taxes are higher or benefits are lower, and the extra revenues are "thrown away."

However, if additional revenues are transferred back, all three experiments generate a welfare gain, ranging from 0.4% to 1.2% in consumption equivalence, as shown in the lower panel of Table 9. These positive outcomes could be considered as a lower bound for the potential welfare gain. If, for example, distortionary taxes are reduced to balance the government budget, the policy could generate a larger welfare gain.

Table 9: Welfare Effects of Alternative Policies (% in Consumption Equivalence)

	Exp 1	Exp 2	Exp 3
Without Tax Rebates			
All	−1.19	−2.02	−0.74
Low	−1.24	−2.13	−0.74
High	−0.66	−0.98	−0.74
With Tax Rebates			
All	+0.36	+0.50	+1.18
Low	+0.30	+0.39	+1.18
High	+0.90	+1.57	+1.18

Implications for Younger Cohorts: Although our quantitative model is calibrated to women born between 1959 and 1969, it is useful to consider how the results may differ for more recent cohorts. We examine descriptive evidence for JPSC Cohort D, consisting of women born between 1979 and 1984. Compared with the baseline cohort used in our calibration, these women have substantially higher educational attainment, with a college attendance rate of 33% rather than 12%, and higher labor force participation at age 35, at 78% rather than 56%. Despite these changes, married women continue to be disproportionately concentrated in contingent employment. At age 35, the share of married women in regular employment is only 4 percentage points higher than in the baseline cohort, whereas the share in contingent employment is 19 percentage points higher. The share enrolled in Category III of the public pension system, which covers

low-income dependent spouses, is also higher. These patterns suggest that the incentives created by the tax and social insurance system continue to influence the employment choices of married women, despite substantial increases in educational attainment and overall labor force participation across cohorts.

At the same time, women in younger cohorts marry less frequently and have fewer children. Thus, although the reforms considered in this section would likely continue to have similar effects on the employment choices of married women in younger cohorts, their aggregate effects on employment and fiscal outcomes may be smaller because a smaller share of women is married and directly exposed to these policy distortions. More fundamentally, marriage and fertility decisions are likely to be jointly determined with women's career choices. Policies that change labor market incentives for married women may therefore also affect family formation decisions. Fully capturing these interactions would require a richer model with endogenous marriage and fertility decisions, which represents an important direction for future research.

6 Conclusion

Data reveal that women lag far behind men in economic participation, and their earnings are significantly lower. A large fraction of female workers are engaged in non-regular contingent jobs, and their income grows very little with experience. This paper builds a quantitative life-cycle model to account for the labor supply and earnings of women and also to evaluate the role of fiscal policies.

We focus on three policies: spousal income tax deductions, exemptions from the payment of social insurance premiums, and survivors' pension benefits. We find that removing each of the three policies raises the participation rates of women by 4.8, 5.0, and 0.5 percentage points, respectively. There is also a large shift in the distribution of employment types. The removal of spousal deductions induces more women to participate in the workforce, but it comes entirely from a rise in the number of lower-income contingent workers. They do not opt for regular jobs because they prefer to keep their earnings low enough to be eligible for exemptions from the payment of social insurance premiums. Removing the premium exemptions raises the participation rates of women by a similar magnitude, but the share of regular workers rises significantly. Women accumulate more human capital on a regular job and their average earnings increase by 17.8%, while the change is smaller at 9.3% when the spousal deductions are removed. Although women would pay more to the government in taxes and social insurance premiums under the policy experiments, their consumption is not necessarily lower since they earn more. The welfare gains range from 0.4 to 1.2% in consumption equivalence when the additional tax revenues are transferred back to them.

The Japanese government states that it is working to promote women's economic par-

ticipation. This paper demonstrates that the removal of policies that create disincentives to work and to accumulate skills would raise the participation and income of women by a significant amount. Such changes would not only help narrow the country's notoriously large gender gap in economic participation, but also improve the welfare of women. Eliminating these barriers will also help mitigate the labor shortages that are expected over the coming decades, in addition to the fiscal tensions due to demographic aging, a topic that we leave for future research.

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