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Barriers to Gender Convergence*

The Interactive Effects of Job Inflexibility and Social Norms

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ABSTRACT This paper investigates the barriers to gender convergence using Japan as a salient environment to explore the interactive effects of labor market structures and social norms. I develop a quantitative model of household labor supply where couples jointly decide their occupations and working hours. The model features a dual labor market characterized by rigid "regular" jobs with convex pay schedules and flexible "non-regular" jobs, interacting with social norms regarding the division of labor and spousal earnings. The calibrated model successfully reproduces observed gender gaps in participation, occupation, working hours, and wages. Counterfactual simulations reveal that while making regular jobs more flexible eliminates the gender wage gap, it fails to close the working hours gap, as social norms continue to impose a disproportionate domestic burden on women. However, the availability of affordable market substitutes for household production significantly mitigates this constraint. These findings highlight that achieving gender convergence requires not only reforming labor market institutions to eliminate the penalty for flexibility but also addressing the unequal burden of domestic work that drives the gendered demand for that flexibility.

Keywords: Gender Wage Gap, Social Norms, Job Inflexibility, Home Production
JEL Codes: J16, J22, J31

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1 Introduction

Goldin (2014) argues that the "last chapter" of the grand gender convergence must involve changes in the labor market, specifically how jobs are structured and remunerated to enhance temporal flexibility. She posits that the gender pay gap would disappear if the premium for long working hours were eliminated. While this structural explanation emphasizes the penalty associated with flexibility, it leaves open the question of the source of the gendered demand for flexibility: why do women specifically sort into these flexible, lower-paying jobs even when occupations are ostensibly open?

In this paper, I argue that Japan provides an ideal setting to answer this question and explore the interactive effects of labor market structures and social norms. Japan is not merely an outlier; it is a magnified version of the challenges facing many developed economies for three key reasons. First, unlike other high-income countries where gender gaps have narrowed, Japan's gender gap remains persistently high, suggesting that the forces hindering convergence are particularly salient here. Second, as I document in Section 2.4, social norms regarding gender roles are pronounced in Japan, allowing for a clear assessment of their impact. Third, the Japanese labor market is characterized by a distinct dual structure of *regular* versus *non-regular* employment, which creates a sharp trade-off between wages and flexibility. This institutional setting closely mirrors the "nonlinear pay schedule" described by Goldin (2014).

Figure 1 illustrates the first point: the persistence of gender gaps. Panel (a) shows the gender gap in median earnings of full-time employees across several high-income countries. While these gaps are gradually closing worldwide, Japan shows little convergence with international trends. The earnings gender gap in Japan remained at 21.3% in 2022, substantially higher than most high-income countries (with Korea being the only exception).

Simultaneously, as shown in panel (b), the share of women in part-time employment has steadily increased in Japan, reaching 31.8% in 2022, higher than in other high-income countries. Interestingly, panel (c) reveals that Japan maintains one of the highest female employment rates among high-income countries, at 81.8% in 2022. Hence, higher female labor force participation in Japan goes together with high part-time work and significant gender gaps in earnings (Teruyama, Goto, and Lechevalier 2018). In the Japanese context, this "part-time" work is largely synonymous with non-regular employment, a category defined by contract status rather than just hours, which relates to the third point about the dual labor market structure.

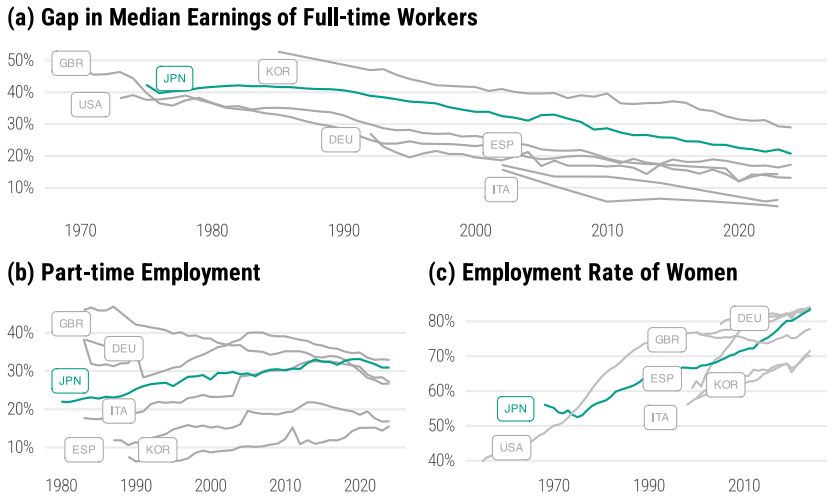


Figure 1: Labor Market in Japan. (a) Gender gap in median earnings of full-time employees relative to male earnings. (b) Share of part-time employment in total employment. Part-time employment is defined as usually working less than 30 hours per week in the main job. (c) Employment rate, calculated as the ratio of employed persons to the working-age population. Sample restricted to ages 25-54. Source: OECD.

To explain why Japanese women disproportionately sort into low-paying, non-regular employment despite high participation rates, I first highlight the institutional distinction between **regular** and **non-regular** employment. Unlike the full-time/part-time distinction common in other economies, which is often based on hours worked, the regular/non-regular dichotomy in Japan is defined by contract type. Regular jobs typically offer permanent contracts and higher wages but demand long working hours and rigid schedules. In contrast, non-regular jobs are characterized by fixed-term contracts and lower wages but provide significantly greater flexibility in terms of hours and location. I document that this institutional structure creates a stark trade-off between earnings and flexibility.

Second, I examine the role of social norms, specifically the male breadwinner norm. I document a sharp discontinuity in the distribution of wives' earnings relative to their husbands' at the 50% threshold, suggesting a strong aversion to wives outearning their husbands. This "gender identity" (Bertrand, Kamenica, and Pan 2015) reinforces the traditional division of labor, where women assume the primary responsibility for domestic work.

I argue that structural barriers (job inflexibility) and cultural barriers (social norms) are mutually reinforcing. The convexity of regular wage schedules makes short hours costly, while social norms make long hours for women socially penalized. This interaction creates a "missing middle" in the choice set for women: they must choose between a high-commitment regular job that violates norms or a low-commitment non-regular job that entails a significant wage penalty. Women, constrained by social norms to prioritize household responsibilities or limit their earnings, are effectively priced out of regular employment and pushed into non-regular jobs, which offer the necessary flexibility but at a steep wage penalty.

To quantify these mechanisms, I develop a model of household labor supply where couples jointly decide their occupations, working hours, and domestic labor hours. In this framework, each partner is endowed with a productivity level, and the household faces a specific domestic labor requirement. Couples choose between regular employment, non-regular employment, or non-employment. Regular jobs feature a convex wage schedule that rewards long hours, while non-regular jobs offer linear compensation but are subject to a productivity penalty. Critically, it incorporates a utility cost when a wife's earnings exceed her husband's, capturing the influence of social norms.

In this economy, couples weigh the benefits of higher potential earnings in regular jobs against the costs of rigid hours and social norm penalties. The model generates realistic patterns of sorting, where husbands typically hold regular jobs while wives often select non-regular positions or exit the labor market to fulfill domestic responsibilities. The model's parameters are calibrated to match observed correlations between husbands' and wives' wages and working hours, as well as the joint distribution of couples' earnings.

After calibration, I evaluate the model's performance by comparing its predictions against empirical gender gaps, outcomes that were deliberately *not targeted* during the calibration process. The baseline model successfully explains a substantial proportion of observed gender disparities: nearly all gaps in participation rates, occupational choices, and labor hours, along with 46.2% of the wage gap. Additionally, the model accurately reproduces both the joint distribution of couples' occupational choices (across regular, non-regular, and non-working categories) and the joint distribution of working hours conditional on these occupational selections.

What role does job inflexibility play in perpetuating these gender gaps, and how can these disparities be mitigated? To address these questions, I conduct counterfactual simulations through the analytical lens of the model. First, I simulate a scenario with *flexible* regular jobs, where the wage schedule is linear rather than convex. I find that this structural change eliminates the gender wage gap, as the wage penalty for shorter hours, a primary driver of the gap, is removed. Second, I examine the potential impact of *outsourcing* housework. Japanese couples rarely utilize external housework services and consequently devote substantial time to domestic tasks, particularly when raising young children. One contributing factor to this pattern is Japan's highly restricted international migration, which limits the availability of household labor.[2] I interpret the benchmark economy as representing a situation where housework services are prohibitively expensive and therefore unused. By allowing households to purchase these services at the median wage rate of non-regular workers from the benchmark economy, the simulation reveals that access to affordable housework services would eliminate significant proportions of existing gaps in labor force participation, occupational choices, working hours, and wages.

Related Literature This paper contributes to the growing body of labor and macroeconomic literature examining the relationship between household responsibilities and gender gaps in the labor market.[3] Goldin and Katz (2011) and Goldin (2014) identify that certain occupations feature

[2]Several studies examine the impact of low-skilled migration on women's labor supply, including Furtado (2016); Cortés and Tessada (2011); Cortés and Pan (2019).

[3]For a comprehensive recent review, see Albanesi, Olivetti, and Petrongolo (2023).

convex (non-linear) wage schedules while others maintain linear relationships between hours and compensation. This distinction aligns with empirical evidence showing that part-time workers typically earn less per hour than their full-time counterparts (Aaronson and French 2004; Ameriks et al. 2020). Building on these insights, Erosa et al. (2022) models couples' occupational decisions across jobs with varying degrees of flexibility. While their framework effectively captures heterogeneous job flexibility through a streamlined approach, it treats the allocation of home hours as exogenous, assuming women inherently dedicate more time to household tasks than men. In contrast, my model endogenously generates these differences through its home production component. Another relevant contribution comes from Cubas, Juhn, and Silos (2023), which models the concentration of working schedules by incorporating penalties for absence during peak hours. They argue that women with children face disproportionate penalties due to their greater household responsibilities. While their approach models job flexibility using detailed time-use data, my framework conceptualizes flexibility through the convexity of wage schedules.

My second contribution lies in explicitly incorporating social norms into couples' occupational choice frameworks. Similar to the patterns Bertrand, Kamenica, and Pan (2015) identified in the United States, Japanese data reveals a pronounced discontinuity in the distribution of wives' earnings relative to their husbands'. This approach bridges the gap between social norms and the structural penalties analyzed in recent literature. Kleven, Landais, and Leite-Mariante (2025) quantifies marriage penalties across countries, and Kleven et al. (2019) shows that social norms are correlated with child penalties. Specifically, I demonstrate that social norms regarding gender roles compel women to assume a disproportionate share of domestic work when households face housework and childcare demands, while job inflexibility further exacerbates these disparities. By elucidating these interactions, I provide insights into the mechanisms driving marriage and child penalties, highlighting how social norms and flexibilities in occupations reinforce each other to generate gender disparities.

Finally, this paper significantly advances our economic understanding of gender gaps in Japan. Despite having one of the largest gender disparities among developed nations, the underlying drivers of Japan's gender inequality have received limited attention in economic literature. Onozuka (2016) examines the partial convergence in Japan's gender wage gap from 1992 to 2002, arguing that women were systematically displaced from regular to non-regular employment during this period. Teruyama, Goto, and Lechevalier (2018) identifies increased female labor supply as a primary factor in the growth of non-regular employment in Japan during the 2000s. Additionally, Kitao and Mikoshiba (2022) provides quantitative analysis of how fiscal policies influence female labor force participation and occupational choices. While these studies offer partial explanations for gender disparities in occupation and wages, few have comprehensively disentangled the structural causes of Japan's gender gaps, and most notably, they have not adequately addressed the role of social norms. To my knowledge, this research represents the first comprehensive analysis that simultaneously explains Japan's gender gaps across four critical dimensions: labor force participation, occupational selection, working hours, and wages.

The remainder of this paper is structured as follows: In the next section, I document key empirical facts about gender gaps in Japan. In Section 3, I develop the baseline model that captures couples'

joint decisions on occupational choices and working hours while incorporating social norms. Section 4 outlines the calibration methodology. Section 5 presents the quantitative results of the baseline model and evaluates its performance in explaining the gender gaps. In Section 6, I conduct counterfactual simulations to explore the mechanisms driving these gaps, specifically focusing on the roles of job inflexibility, social norms, and the outsourcing of housework. Section 7 summarizes the findings and discusses their implications.

2 Stylized Facts

This chapter presents descriptive evidence on the sources of gender gaps in the Japanese labor market. To this end, I introduce the distinction between **regular** and **non-regular** employment—a key institutional feature of the Japanese labor market. I document significant gender differences in the selection into these job types and show that this sorting reflects a fundamental trade-off between wage and flexibility. Furthermore, I highlight the role of social norms, particularly the male breadwinner norm, as a root cause of these gender disparities.

2.1 Data

This paper mainly relies on the Japanese Panel Study of Employment Dynamics (JPSED). JPSED is panel data of individual workers since 2016, with the most recent data wave from 2024.[4] The sample is 57,284 individuals older than 15. This survey has information on earnings, working hours, domestic labor hours, and types of jobs. For married individuals, it also contains information on the spouse's job and earnings.

For the main analysis, I use the pooled data of JPSED2017-2020. The JPSED2016 does not have information on the domestic labor hours, which is important for this analysis. JPSED2021 and later waves may be affected by the COVID-19 pandemic. The sample includes married men and women aged between 25 and 59, who are in the labor market.

2.2 Regular and Non-Regular Workers

In the context of Japanese statistics, the terms **regular** and **non-regular** jobs are widely used to categorize employment types. Since it is based on the job categorization of each company, there are no legal or precise definitions.[5] However, they are typically described as follows: A regular worker usually has a permanent contract, works 40 hours or more at a higher wage, while a non-regular worker has a temporary contract and works less than 40 hours at a lower wage.

Panel (a) in Figure 2 shows that 36.1% (46.4%) of male (female) regular workers work exactly 40 hours per week and 52.3% (26.9%) works more than that. On the other hand, only 33.7% (3.0%) of non-regular male (female) workers work more than 40 hours. In addition, panel (b) shows that these two occupations differ in hourly wages. While 33.1% (66.6%) of non-regular male (female) workers work with a wage less than 1000 JPY[6], only 4.0% (17.0%) of regular workers do. Note that using the OECD definition of "less than 30 hours per week in their main job," 16.5% (74.4%) of male (female) non-regular workers would be categorized as being in part-time employment.

[4] Data was distributed one year later. The data in 2023 was distributed in 2024 and called JPSED2024.

[5] See Asao (2011) for a more detailed discussion on the definition of regular and non-regular jobs.

[6] 1000 JPY $\simeq$ 5.56 EUR.

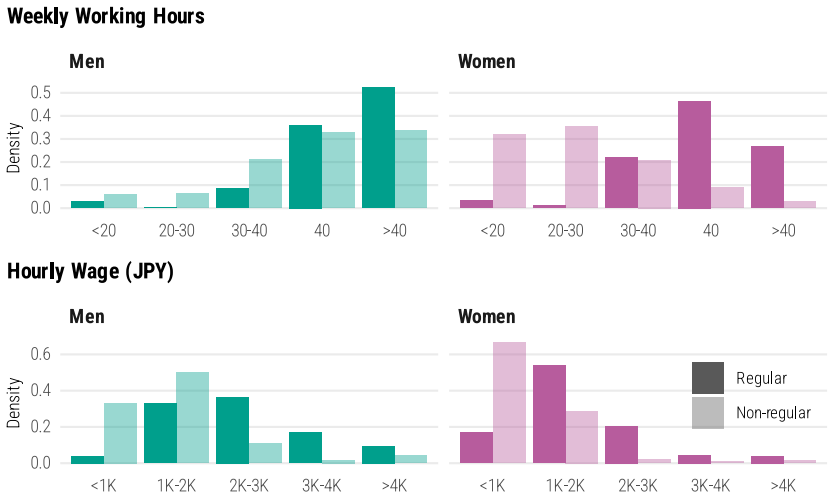


Figure 2: Distribution of Weekly Working Hours and Hourly Wage. The data is pooled from JPSED 2017-2020. The sample includes married men and women aged 25-59.

The gender gap in occupational choices is shown in Figure 3 . We can see clear gender differences in occupational choices in married individuals. While almost 90% of men work as regular workers, less than 30% of women work as regular workers, and the share decreases by age. In addition, the proportion of non-regular workers is much higher in female employees; almost half of the female employees choose non-regular jobs.

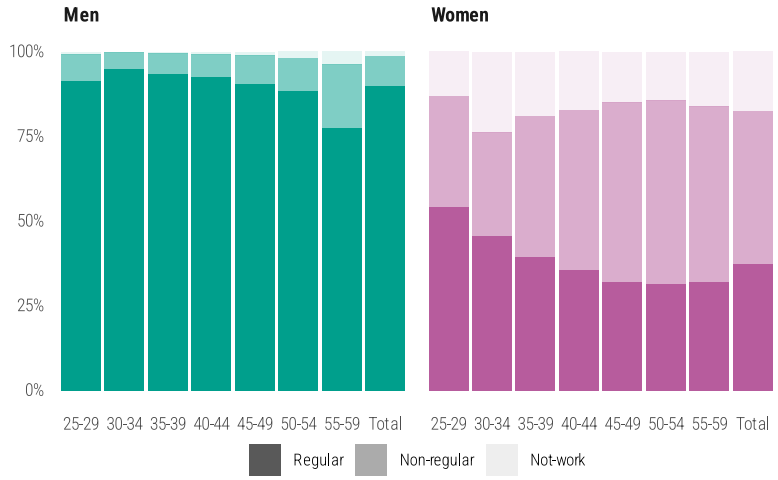


Figure 3: Occupational Choice of Married Individuals. The data is pooled from JPSED 2017-2020. The sample includes married men and women aged 25-59.

Given the substantial disparities in wages and working hours between regular and non-regular employment, this divergence in occupational choice serves as a primary driver of the gender wage gap. Furthermore, the occupational segregation itself represents a distinct and critical dimension of gender inequality in the labor market.

Differences from Full-time and Part-time Employment While economic literature often distinguishes between full-time and part-time employment, I focus on the distinction between regular and non-regular jobs. The full-time/part-time dichotomy is typically defined by hours worked (e.g., the OECD defines full-time as working 30 hours or more per week). If workers can freely choose their hours, this classification becomes an endogenous outcome of their labor supply decisions. In contrast, the regular/non-regular distinction is an exogenous categorization defined by the employer and employment contract, representing distinct choice sets available to workers. As discussed in Section 2.3, these two job types differ fundamentally in their wage structures and flexibility, presenting workers with a clear trade-off.

2.3 Job Flexibility

Why do women choose non-regular jobs? To answer the question, I map regular and non-regular jobs into non-linear and linear jobs in Goldin (2014), who emphasizes that some jobs have a highly non-linear (convex) pay structure with respect to working hours, while others have one almost perfectly linear. Given a non-linear wage schedule, a worker can work at a high wage in exchange for long working hours. On the other hand, a linear job worker can flexibly decide their working hours since there is no penalty in wages for reducing working hours. Hence, there is a trade-off between job flexibility and wage.

Figure 4 represents a direct measurement of the flexibility of regular and non-regular jobs, based on survey data. The questions asked regular and non-regular workers about the flexibility of their jobs with a 5-scale measurement: 5 is the highest and 1 is the lowest. Each point shows the mean of the job flexibility in terms of working days, working hours, and working place. We can see that the regular worker has less flexibility in all aspects. Also, female non-regular workers have more flexibility than male regular workers, while female regular workers have the same inflexibility as male regular workers.

Figure 4: Flexibility of Regular and Non-regular Jobs. Pooled data from JPSED 2017-2020. The sample includes married men and women aged 25-59. The figure plots the mean score of job flexibility (1: Inflexible to 5: Flexible) regarding working days, hours, and place.

Finally, if regular jobs require 40 hours of commitment and women have to allocate a large amount of time to housework, they may choose non-regular jobs, which are more flexible. Actually, Figure 5 supports this argument. This figure shows the reasons why married women in the non-regular workforce chose their current job. More than 60% of the women chose "job flexibility" as the reason and nearly 40% chose "housework". We can also see "cannot get regular jobs" is not the main reason (less than 10%) why they chose non-regular jobs.

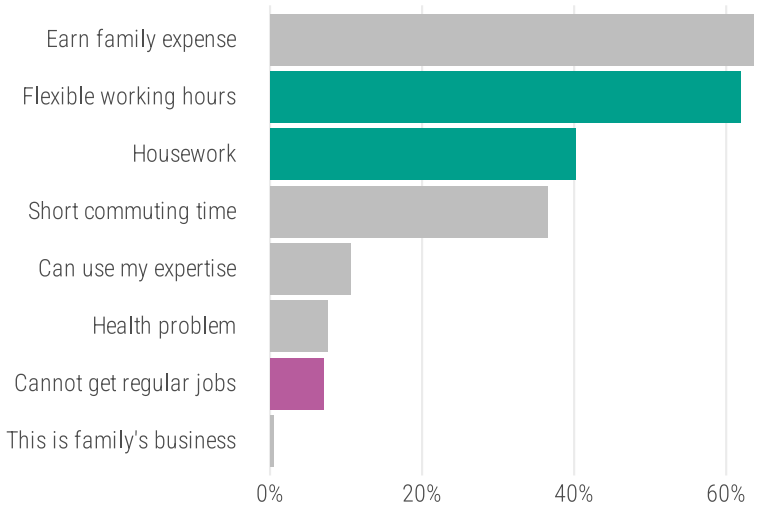


Figure 5: Reasons Why Women Choose Non-regular Work. The data is pooled from JPSED 2017-2020. The sample includes married women aged 25-59 who have non-regular jobs. Respondents could select multiple reasons.

While job inflexibility is not unique to Japan, it is more severe than in other countries. Since there is no survey asking the same question about job inflexibility in Japan and other countries, as a proxy measurement, I use a question in JPSED and the Labor Force Survey of Eurostat. In the JPSED, respondents are asked to rate their agreement with the statement "I was able to choose my working days" on a scale of 1 to 5. Eurostat has a question of "Persons in employment by level of difficulty to take one or two hours off at short notice", the respondents answer on a 1-4 scale. To match the JPSED sample to Eurostat, I use men and women employed, aged between 35 and 49, and having children, and rescale the level of difficulty to the 1-4 scale. Although this is not a direct comparison between Japan and other countries, Figure 6 indicates that regular workers in Japan might have more difficulty taking a day off.

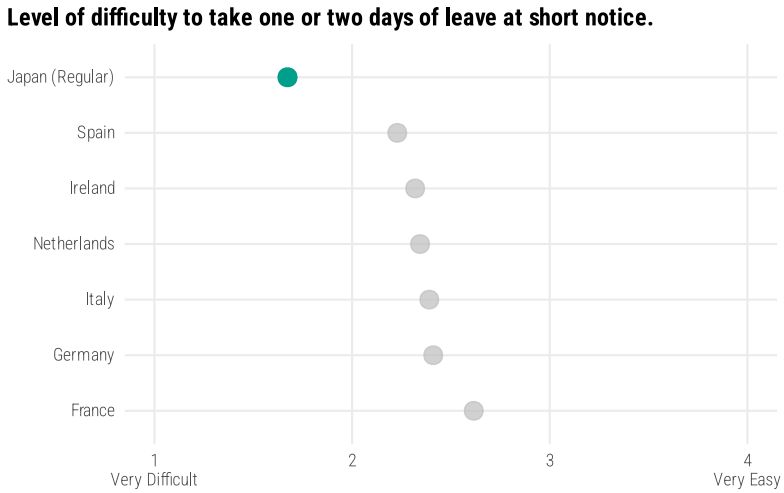


Figure 6: Flexibility of Working Days. The sample includes employed men and women aged 35-49 with children. Data sources are the Eurostat Labor Force Survey (2019) for European countries and JPSED for Japan. For Japan, the sample is restricted to regular workers.

2.4 Social Norms

While the difference in flexibility between occupations is crucial, these job characteristics should, in principle, be symmetric for men and women. Where, then, does the gender disparity originate? In this paper, I focus on social norms regarding gender roles, specifically the male *breadwinner* norm—the expectation that husbands should earn more than their wives. This can be interpreted as the flip side of the norm that women should bear the primary responsibility for housework and childcare.

Bertrand, Kamenica, and Pan (2015) show that there is a sharp drop in the distribution of household income share at the line that wives earn more than their husbands. This type of gender role plays similarly in Japan. Figure 7 shows the distribution of the earning share of wives. We can see a clear gap between below 50% and above 50%, which suggests discontinuous behavior at the point where a wife earns more than her husband.[7] In addition, the rising pattern just before 50% supports the strength of this social norm.

[7] I conduct robustness check with smaller bins. The results, which are similar, are in Section A.1.

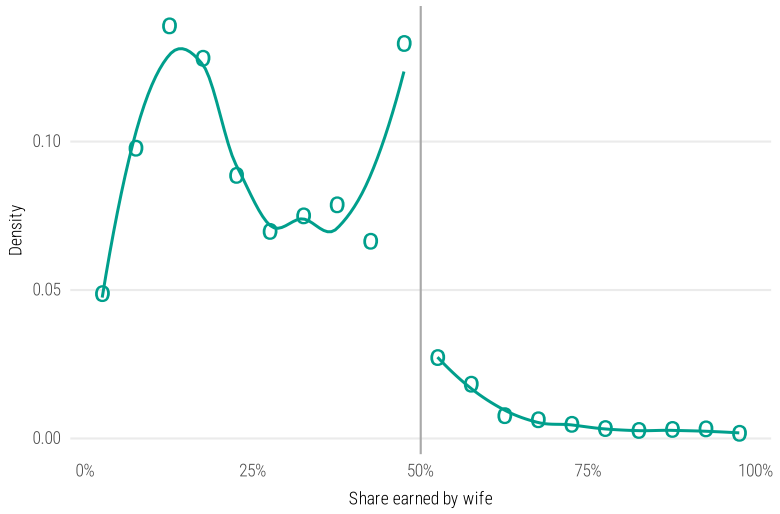


Figure 7: Distribution of Relative Earnings. The data is pooled from JPSED 2017-2020. The sample includes married couples aged 25-59. Dual-earner couples only. Each dot represents the density of couples in a 0.05 relative earnings bin. The vertical line indicates where the wife's share of earnings is 0.5. The dashed line is a lowess smoother applied to the distribution, allowing for a break at 0.5.

If there is a penalty for higher wives' earnings, which reflects social norms, women, upon marriage, will be more likely to choose shorter working hours, non-regular jobs, or exit from the labor market. In Figure 8 , I show the event study of labor market outcomes since they got married. The sample and the estimation method are explained in Section A.2. My approach follows the recent literature that studies the impact of children on gender gaps, e.g., Kleven, Landais, and Søgaard (2019), but focuses on marriage rather than the childbearing event.[8]

Since JPSED is an individual survey for workers, I cannot observe individuals who exit from the labor market after marriage. Thus, I focus on individuals who are employed before and after marriage. From the figure, we can see significant decline in working hours and the share of regular workers only for women, and a significant increase in domestic labor hours. There is a drop but insignificant in earnings.

If I could include those who exited the labor market, the results would likely be reinforced: labor market exit implies zero earnings, zero working hours, and no regular employment, along with a likely increase in domestic labor hours. Therefore, the observed penalties in earnings, regular employment share, and working hours, as well as the increase in domestic work, would be even more pronounced.

[8]For a set of European countries, Berniell et al. (2022) estimate the separate effects of marriage and childbearing on women's labor market outcomes, and find a relatively small role for marriage. Kleven, Landais, and Leite-Mariante (2025) compute the marriage and child penalty on employment rate for Brazil, China, Japan, Mauritius, Rwanda, Sweden, the United Kingdom, and Zambia. Herold and Wallossek (2023) calculates marriage earning gaps with German administrative data.

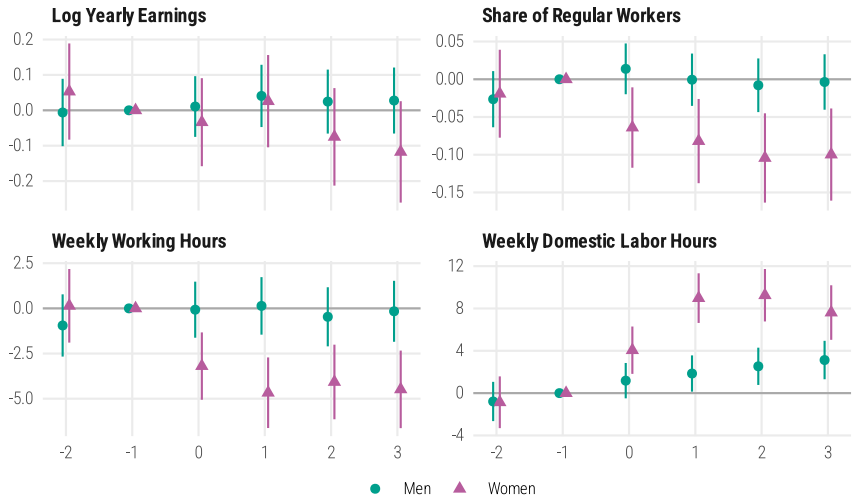


Figure 8: Impact of Marriage on Labor Outcomes. The data is from JPSED 2016-2024. For sample construction details, see Section A.2. Each point represents the estimated coefficient relative to the year prior to marriage ($k = -1$). Error bars indicate 95% confidence intervals based on standard errors clustered at the individual level.

While these social norms are observed in many countries, they are particularly strong in Japan. In World Value Surveys, there is a question asking, "If a woman earns more money than her husband, it's almost certain to cause problems." The respondents answer on a 1-5 scale; 1 is "strongly agree" and 5 is "disagree strongly". Figure 9 plots the mean of the score by country. Among these high-income countries, Japan has the strongest social norms.

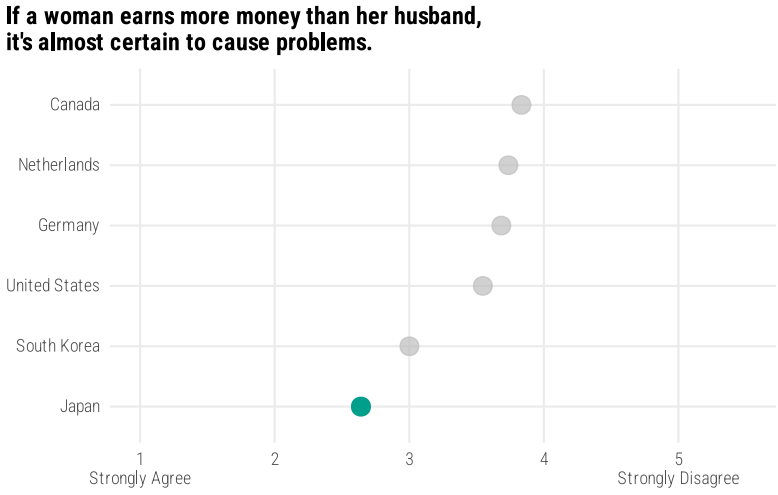


Figure 9: Social Norms on Wives' Earnings. Each data point represents the mean agreement score by country (1: Strongly Agree to 5: Strongly Disagree). Source: World Value Survey Wave 7 (2017-2022).

3 Model

3.1 Overview

The model economy is populated by married couples that consist of a male and a female, denoted by $g \in \{m, f\}$. A couple decides its occupational choices and the allocation of market and domestic labor hours to maximize their joint utility. The occupations can be regular, R, or non-regular, NR. Not working is denoted by NW. If an individual works, they also decide on their market hours, h_m and h_f. Each individual is endowed with one unit of time and a requirement of joint domestic labor hours D. This requirement differs across households, and each household decides their domestic labor hours d_m and d_f, satisfying $D = \zeta\left(d_m, d_f\right)$. Each individual is endowed with a productivity (ability) level, denoted by a_g. These ability levels are drawn from a joint distribution for the couple.

3.2 Model Components

Utility Function

$$u(c, h + d) = \log c - \phi \frac{(h + d)^{1+\gamma}}{1 + \gamma},$$

where c is consumption, $h + d$ is the total labor hours (market plus domestic), $\phi > 0$ is a weight on disutility from labor, and $\gamma > 0$ captures the curvature of disutility from labor.

Productivity I also assume that the set of productivities $\left(a_m, a_f\right)$ is different across couples. In particular, $\left(a_m, a_f\right)$ is drawn from a log-normal distribution.

Convex wage schedules Following Goldin (2014) and Erosa et al. (2022), regular and non-regular jobs in the model differ in how hours worked, h_m, map into effective labor input that determines earnings. For regular jobs, effective labor input is a convex function of hours worked, i.e., the longer an individual works, the higher her effective labor input. This creates incentives to work longer hours since there is an implicit penalty for working short hours. In contrast, the relation between hours worked and effective labor input is linear for non-regular jobs. As a result, if one of the partners cannot supply long hours, they have an incentive to select a non-regular occupation.

Figure 2 shows that 36.1% (46.4%) of regular male (female) workers work exactly 40 hours per week and that 52.3% (26.9%) works more than that. This suggests that 40 hours of work per week is a standard requirement for regular workers and makes it difficult for women to work as regular workers.

To capture these two features, i.e., linear vs. non-linear jobs and a concentration of 40 hours per week, I assume that the production function for regular (non-linear) jobs is given by

$$e(h, a, j = R) = \begin{cases} a h^{1+\theta} & \text{if } \; h \leq \overline{h} \\ a \overline{h}^{\theta} h & \text{if } \; h > \overline{h}. \end{cases}$$

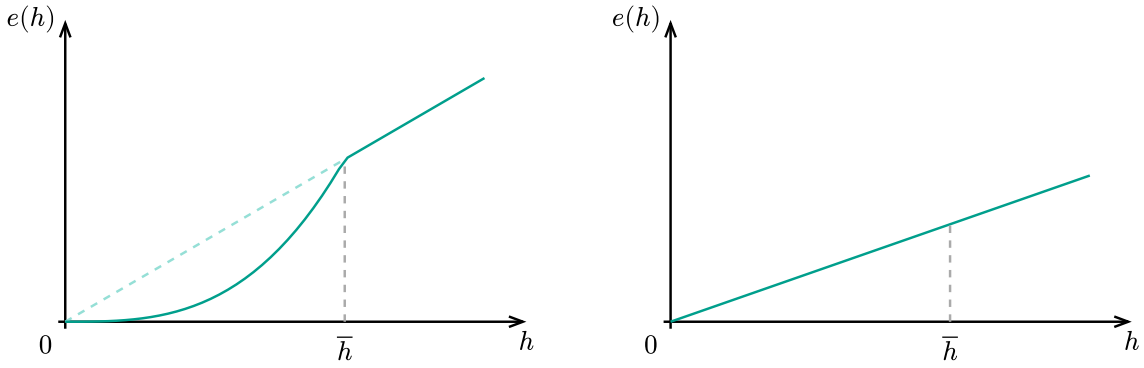
$\overline{h}$ is set to 40 hours per week. The parameter $\theta > 0$ captures the convexity of the earnings curve for regular jobs. The slope of the earnings after 40 hours is the same as that at 40 hours, i.e., $a\overline{h}^{\theta}$.

For non-regular jobs I assume that the production function is linear:

$$e(h, a, j = NR) = \psi a \overline{h}^{\theta} h.$$

The parameter $0 < \psi < 1$ represents a wedge that captures the difference in productivity between regular and non-regular jobs. If a regular worker changes to a non-regular job and works the same hours (but more than 40 hours), her earnings decrease by $1 - \psi$.

The wage schedules for regular and non-regular jobs are illustrated in Figure 10 . Since $\theta > 0$, regular workers have an incentive to work longer hours. It also means that if one of the spouses chooses a regular job and works long hours, the other wants to work short hours and select non-regular jobs.



(a) Regular Job (b) Non-Regular Job

Figure 10: Convex Wage Schedule for Regular Jobs vs. Linear Schedule for Non-Regular Jobs.

Domestic Labor Hours Requirement I assume that each household is given a domestic labor hours requirement D and they choose the allocation of d_m and d_f. D is heterogeneous across households, which reflects the fact that the amount of domestic labor hours differs based on the number of children and their age. In particular, I consider that D is drawn from a cumulative distribution F_D.

To satisfy the requirement, couples need to allocate their domestic labor hours with the following joint domestic production function:

$$\zeta\left(d_m, d_f\right) := \left(d_m^{\xi} + d_f^{\xi}\right)^{\frac{1}{\xi}} = D. \tag{1}$$

If domestic labor hours are perfect substitutes, i.e., $\xi = 1$, the couple will allocate all domestic labor hours to the partner with a lower opportunity cost (wage). However, in reality, couples tend to share domestic labor hours even when there is a large difference in wages between the partners. To capture this feature, I assume that $\xi < 1$, which implies that domestic labor hours are imperfect substitutes.

3.3 Household Problems

Household decisions are made in two steps. First, given productivities $\left(a_m, a_f\right)$ and domestic labor hours requirement D, the couple chooses their occupational choices $\left(j_m, j_f\right)$ to maximize their expected joint utility. Second, given the occupational choices, they decide the allocation of market and domestic labor hours to maximize their joint utility.

Household Allocations

Given their occupational choices $\left(j_m, j_f\right)$, the couple chooses market hours $\left(h_m, h_f\right)$ and domestic labor hours $\left(d_m, d_f\right)$ to maximize their joint utility:

$$U^{j_m,j_f} = \max_{c_m,c_f,h_m,h_f,d_m,d_f} u(c_m, h_m + d_m) + u\left(c_f, h_f + d_f\right) - \delta \cdot \mathbb{1}\left\{e_f > e_m\right\},$$

subject to

$$c_m + c_f = e(h_m, a_m, j_m) + e\left(h_f, a_f, j_f\right),$$
$$D = \zeta\left(d_m, d_f\right).$$

The last term in the joint utility, which is motivated by Figure 7 , represents the utility cost from wife earning, $e_f = e\left(h_f, a_f, j_f\right)$, more than the husband, $e_m = e(h_m, a_m, j_m)$. The δ captures the social norm that the husband should earn more than the wife (breadwinner norm).

Occupational Choices

The couple chooses their occupational choices $\left(j_m, j_f\right)$ to maximize their expected joint utility:

$$j_m, j_f = \arg\max_{j_m,j_f} U^{j_m,j_f} + \varepsilon^{j_m,j_f},$$

where ε^{j_m,j_f} represents the idiosyncratic preference shock for the occupational choice combination $\left(j_m, j_f\right)$. I assume that ε^{j_m,j_f} is independently and identically distributed according to the type-I extreme value function. Hence, the probability that the couple selects occupational choices $\left(j_m, j_f\right)$ is given by the multinomial logit formula:

$$\Pr\left(j_m, j_f\right) = \frac{\exp\left(\frac{U^{j_m,j_f}}{\eta}\right)}{\sum_{j_{m'} \in \{R,NR,NW\}} \sum_{j_{f'} \in \{R,NR,NW\}} \exp\left(\frac{U^{j_{m'},j_{f'}}}{\eta}\right)},$$

where η is the scale parameter of the extreme value distribution.

Minimum Working Hours

In the model, I also consider that regular and non-regular jobs have minimum working hours requirements, denoted by $\underline{h}_R$ and $\underline{h}_{NR}$, respectively. If an individual chooses to work as a regular (non-regular) worker, they must work at least $\underline{h}_R$ ($\underline{h}_{NR}$) hours per week. This captures the fact that firms often set minimum working hours requirements for their employees. In particular, I set

$\underline{h}_R$ at 20 hours per week and $\underline{h}_{NR}$ at 10 hours per week based on the distribution of working hours in Figure 2 .

This condition is also necessary to discipline the model since, without it, an individual with a job (R or NR) working zero hours and an individual not working (NW) would yield the same utility, and the probability of choosing R or NR would be ill-defined.

To sum up, the earning schedule is given by

$$e(h,a,j=R)=\begin{cases}0 & \text{if } h<\underline{h}_R\\ ah^{1+\theta} & \text{if } h\leq\overline{h}\\ a\overline{h}^{\theta}h & \text{if } h>\overline{h}\end{cases}$$

$$e(h,a,j=NR)=\begin{cases}0 & \text{if } h<\underline{h}_{NR}\\ \psi a\overline{h}^{\theta}h & \text{if } h\geq\underline{h}_{NR}\end{cases}$$

$$e(h,a,j=NW)=0.$$

4 Calibration

4.1 Calibration Strategy

I assume that occupation-specific productivity levels $\left(a_m, a_f\right)$ are drawn from a multivariate log-normal distribution. I set the mean of log productivity for males, $\mu_m = 0$, as a normalization. To reduce the number of parameters, I assume the variance of the log productivity is the same between males and females.

Based on these assumptions, the productivity levels of a couple are drawn from:

$$\log\begin{pmatrix}\alpha_m\\ \alpha_f\end{pmatrix}\sim\mathcal{N}\left(\begin{pmatrix}0\\ 0\end{pmatrix},\begin{pmatrix}\sigma^2 & \rho\sigma^2\\ . & \sigma^2\end{pmatrix}\right).$$

The home requirements also differ across couples according to

$$D\sim Beta(\alpha,\beta).$$

This heterogeneity represents differences in domestic labor hours based on the number and age of children. One of the advantages of using the Beta distribution is that it is defined on a finite interval, $(0,1)$, which can be satisfied by one person or shared by both.

There are two parameters that I set exogenously. Following Erosa et al. (2022), I set the curvature of labor disutility, $\gamma = 3$, so that the Frisch elasticity is fixed at a value of $\frac{1}{3}$. Additionally, following Knowles (2013), I set the intra-household elasticity of substitution for domestic labor, $\xi = \frac{2}{3}$, which corresponds to an elasticity of 3.[9]

[9]Knowles (2013) estimates the intra-household elasticity of substitution for domestic labor to be around 3 using the British Household Panel Survey data. He uses a generalized CES utility function:

$$\left((1-\eta_0)d_m^{1-\eta_1}+\eta_0 d_f^{1-\eta_1}\right)^{\frac{1}{1-\eta_1}},$$

Given these functional assumptions, there are 9 parameters to be calibrated:

$$\Pi = \left(\underbrace{\theta, \psi}_{\text{production}} \quad , \quad \underbrace{\eta}_{\text{shock}} \quad , \quad \underbrace{\phi}_{\text{preference}} \quad , \quad \underbrace{\sigma, \rho,}_{\text{productivity}} \quad \underbrace{\alpha, \beta,}_{\text{domestic labor}} \quad \underbrace{\delta}_{\text{social norm}} \right).$$

The set of parameters Π is estimated to get the best fit possible for the model's predictions. Defining the i-th data target and the model's solution for this target by D_i and $M_i(\Pi)$, the calibration minimizes the following objective function:

$$\min_{\Pi} \sum_i \left[\frac{D_i - M_i(\Pi)}{D_i} \right]^2. \tag{2}$$

4.2 Moments

Table 1 summarizes the calibrated parameters and their corresponding target moments. While the model parameters are jointly estimated, each is associated with the moment it most directly impacts.

The production parameter θ is determined by the share of regular workers. The relative utility of non-regular jobs influences the share of non-regular workers, which is captured by the idiosyncratic shock parameter η. The wage penalty parameter ψ is pinned down by the log wage differential between regular and non-regular jobs, while the labor disutility ϕ is calibrated to the mean working hours of male regular workers.

The productivity distribution parameters (σ, ρ) are targeted to the gender wage gap for regular workers, the dispersion of log wages, and the spousal correlation in earnings. Parameters governing domestic labor (α, β) are captured by the mean of domestic labor hours. Finally, the social norm parameter δ is calibrated to match the share of households where the wife earns more than the husband.

Importantly, female market outcomes are not targeted, except for the regular wage gap. Thus, the model's predicted gender gaps emerge endogenously from the structural asymmetries: the productivity gap μ_f and the social norm δ.

and estimated $\eta_0 = 0.475$ and $\eta_1 = 0.33$. η_0 is highly close to 0.5, indicating that husbands and wives equally share domestic labor in terms of efficiency units, which is consistent with the functional form of (1) .

Table 1: Calibration Results of Baseline Model

Parameter	Value	Target	Data	Model
θ	3.03	Share of regular workers, males	0.90	0.87
η	0.18	Share of non-regular workers, males	0.09	0.09
ψ	0.58	$\overline{\log w_{m,R}} - \overline{\log w_{m,NR}}$	0.64	0.72
ϕ	16.22	$\overline{h_{m,R}}$	0.40	0.41
σ	0.67	$sd(\log w_{m,R})$	0.62	0.68
ρ	0.49	$\text{Corr}(\log e_{m,R}, \log e_{f,R})$	0.21	0.21
α	12.45	$\overline{d_{m,R}}$	0.10	0.10
β	15.41	$\overline{d_{f,R}}$	0.22	0.18
δ	0.82	Share of $e_f > e_m$	0.07	0.07

Notes: The first and second columns show the estimated values of the model parameters. The third column lists the calibration targets, while the fourth and fifth columns report their moment values in the data and the baseline model, respectively. The parameters are estimated by minimising the distance between the data and model moments defined by (2) .

4.3 Estimated Results

The second column in Table 1 shows the estimated parameter values. By comparing the fourth and the fifth columns, which are the moments in the data and the model, we can see that the model matches all the targets reasonably well. The convex wage schedule parameter $\theta = 3.03$ is sufficiently larger than zero, indicating that regular jobs have non-linear earnings schedule and penalize short working hours. The wedge of non-regular jobs $\psi = 0.58$ implies that non-regular jobs pay approximately 42.1% less than regular jobs for the same hours worked beyond 40 hours per week.[10] The gender correlation in skills $\rho = 0.49 > 0$ implies positive assortative mating. The requirement of home hours has the mean $0.45 \left(= \frac{\alpha}{\alpha+\beta}\right)$, which corresponds to 50.0 hours per week in case when only one spouse provides the domestic labor. The rest of the parameters $\eta = 0.18$, $\sigma = 0.67$, $\psi = 0.58$, $\delta = 0.82$ show reasonable values and contribute to matching the moments.

5 Baseline Economy

5.1 Occupational Choices and Hours Worked

I show how the model economy performs along dimensions that are not targeted in the calibration. In Table 2 , I present the occupational choice matrix for husbands and wives. The rows are husbands' jobs and the columns are wives' jobs, and each cell represents the ratio of the combination of the couple's occupational choices to the total. Overall, the model explains the distribution of occupations well. However, more husbands do not work in the model than in the data. It suggests

[10] One of the reasons why non-regular jobs pay less is that non-regular workers are less likely to have job training. According to JPSED,42.8% (37.7%) of male (female) regular workers have additional opportunities for training given by their employers (off-the-job training), while 27.1% (21.6%) of male (female) non-regular workers have.

that the inflexibility of regular jobs (convexity of their earnings) is excessive or the social norms on gender roles are insufficient.

Table 2: Occupational Choice in Baseline Model

	Wife		
Husband	Regular	Non-regular	Not-work
Data			
Regular	0.35	0.38	0.17
Non-regular	0.01	0.07	0.01
Not-work	0.01	0.01	0.00
Model			
Regular	0.24	0.34	0.30
Non-regular	0.04	0.04	0.01
Not-work	0.04	0.00	0.00

Notes: The table shows the occupational choice of husbands and wives. The rows represent husbands' occupations, and the columns represent wives' occupations. Each cell reports the share of couples in the corresponding occupational combination.

Finally, I compare the time allocation of couples in each occupation in Table 3 . The model successfully replicates the characteristic patterns: First, husbands work longer than wives. Second, regular workers work longer than non-regular workers.

Table 3: Allocation of Weekly Working Hours of Baseline Model

		Data		Model	
Husband	Wife	Husband	Wife	Husband	Wife
Regular	Regular	44.4	39.7	42.0	35.4
Regular	Non-regular	45.4	23.5	44.9	15.4
Non-regular	Regular	37.0	39.7	23.0	42.5
Non-regular	Non-regular	39.8	25.5	40.0	21.5

Notes: The table shows the allocation of weekly working hours by couple's occupations. Columns 1-2 show the husband's and wife's occupations. Columns 3-4 report the data, and Columns 5-6 report the model predictions.

5.2 Gender Gaps

How do gender gaps in the model economy, which are not directly targeted, compare with the data? Table 4 shows the gender gaps in the aggregate economy. The first column shows the statistics from the data and the second column is the simulation results. The third column shows the ratio of the model to the data column. The first row, the gender gap in participation, means the difference in participation rates across genders. The second row, the gender gap in occupation, represents the difference between the share of regular workers. For example, the value 0.53 in

the data column represents the difference in the ratio of regular workers (90.0 % for males and 37.4% for females.) The third and fourth rows are the gender gaps in log working hours and wages. One of the most interesting findings is that the model explains almost all of the gender gap in the participation rate (166.0%), occupational choices (104.7%), and working hours (137.3%). This is consistent with the social norm against wives' higher earnings. Women have the incentive to reduce their earnings (to zero) by quitting their jobs, changing their occupations, or reducing their working hours. In addition, the model explains a significant proportion of gender gaps in wages (46.2%).

Table 4: Gender Gaps in Baseline Model

	Data	Model	Ratio
Participation	0.16	0.27	166%
Occupation	0.53	0.55	105%
Labor Hours	0.49	0.67	137%
Wage	0.76	0.35	46%

Notes: This table shows gender gap measurements and their values in the data and the model. "Participation" refers to the difference in participation rates between males and females. "Occupation" is the gap in the share of regular workers. "Labor Hours" and "Wage" represent the differences in mean log working hours and mean log hourly wages, respectively. The "Ratio" column reports the ratio of the model gap to the data gap.

6 Counterfactual Simulations

6.1 Flexible Regular Jobs

What accounts for the gender wage gap and part-time work in Japan? In the model, two factors play a key role in answering these questions: **job inflexibility** and **social norms**. As discussed in Section 2, Japan has relatively strong social norms on wives' earnings, and the job inflexibility of Japanese regular workers is high.

To this end, I run simulations with flexible regular jobs, i.e., the earning schedule $e(\cdot)$ is set to be linear:

$$e(a,h,j=R) = \begin{cases} 0 & \text{if } \ h < \underline{h}_R \\ a\bar{h}^{\theta}h & \text{if } \ h \geq \underline{h}_R \end{cases}$$

Table 5 compares the choice of occupations between the baseline and the flexible regular job cases. We can see an increase in the share of couples with regular jobs (from 23.8% to 43.0%). This is consistent with the fact that job inflexibility is one of the main reasons for women choosing non-regular jobs (Figure 5).

Table 5: Comparison in Occupational Choice

	Wife		
Husband	Regular	Non-regular	Not-work
Baseline			
Regular	0.24	0.34	0.30
Non-regular	0.04	0.04	0.01
Not-work	0.04	0.00	0.00
Flexible Regular Jobs			
Regular	0.43	0.23	0.21
Non-regular	0.06	0.02	0.01
Not-work	0.03	0.00	0.00
Outsourcing			
Regular	0.50	0.26	0.15
Non-regular	0.05	0.02	0.01
Not-work	0.03	0.00	0.00

Notes: This table shows the fraction of each combination of couples' occupations. The first panel shows the results of the baseline model. The second and the third panel is the simulation results of linearizing the wage schedule of regular jobs, fixing other parameters. The third panel shows the results of the counterfactual economy with outsourcing of housework.

Table 6 presents the impact of flexible regular jobs on gender gaps. The introduction of linear wage schedules substantially reduces gender disparities, eliminating 28.4% of the participation gap, 34.8% of the occupational gap, and 74.1% of the wage gap. However, the labor hours gap remains largely unaffected. Even when the pecuniary penalty for flexibility is removed, the asymmetry in domestic responsibilities persists (Table A.1). As long as social norms compel women to supply the majority of household labor, their opportunity cost of market work remains high, preventing full convergence in hours. Consequently, contrary to the prediction in Goldin (2014), the gender gap does not vanish entirely. The remaining disparities highlight the significant portion of the gender gap that is attributable to social norms rather than structural barriers alone.

Table 6: Comparison in Gender Gaps

	Baseline	Flexible Regular Jobs	Outsourcing
Participation	0.27	0.19 (71.6%)	0.13 (48.1%)
Occupation	0.55	0.36 (65.2%)	0.33 (60.8%)
Labor Hours	0.67	0.69 (103.6%)	0.39 (58.7%)
Wage	0.35	0.09 (25.9%)	0.13 (36.4%)

Notes: This table shows gender gaps measurements for baseline, flexible regular job cases, and outsourcing cases. The brackets shows the percentage of gaps remained compared to the baseline.

6.2 Outsourcing of Housework

Recent literature emphasizes that the marketization of home production is a key determinant of female labor supply and the gender wage gap. For instance, Cortés and Pan (2019) show that the availability of market substitutes for household production allows high-skilled women to work longer hours, thereby narrowing the gender wage gap. Similarly, Duval-Hernández, Fang, and Rachel Ngai (2023) find that cross-country differences in the marketization of home production explain a significant portion of the variation in female working hours. Low-skilled immigration often facilitates this marketization by lowering the cost of domestic services (Furtado 2016; Cortés and Tessada 2011).

In contrast, Japan's usage of external household services remains exceptionally low. According to the Family Income and Expenditure Survey 2021 of the Japanese Statistics Bureau, households of two or more persons spend only 2.6 euros per *year*.[11] This is partly due to restrictive immigration policies.

Suppose households could purchase household services in the market in Japan. How would this affect gender gaps? To answer this question, I extend the baseline model as follows.

$$U^{j_m,j_f} = \max_{h_m,h_f,d_m,d_f} u(c_m, h_m + d_m) + u\big(c_f, h_f + d_f\big) - \delta \cdot \mathbb{1}\big\{e_f > e_m\big\},$$

subject to

$$c_m + c_f + pd = e_m\big(h_m, a_{m,j}, j_m\big) + e_f\big(h_f, a_{f,j}, j_f\big),$$

$$D = \left(d_m^{\xi} + d_f^{\xi} + d^{\xi}\right)^{\frac{1}{\xi}}.$$

where d is purchasable housework hours, and p is its price. This model allows couples to buy outside household labor services and to satisfy the home hours constraint. In other words, it encourages high-skilled men and women to work more in the labor force.

Given the scarcity of housework services, we can consider that the price of external housework, p, in the benchmark economy is too expensive in Japan so $d = 0$. Then, I conduct a simulation of

[11] I use the category "540 Housekeeping services".

the case where the price of housework services is affordable. In particular, I set its price as the mean and median wage of a non-regular job in the benchmark economy ($p = \psi\bar{h}^{\theta}$). Here, I assume that housework services are provided by non-regular jobs. The rest of the parameters are fixed at the calibration of the baseline model.

Similar to the case of flexible regular jobs, Table 5 shows an increase in the share of couples with regular jobs (from 23.8% to 49.7%). This is because outsourcing housework reduces the burden of domestic labor (Table A.1), thereby allowing wives to work more in regular jobs.

Table 6 shows the remaining gender gaps under external housework services. It eliminates significant proportions of all types of gender gaps (52% in participation, 39% in occupation, 41% in working hours, 64% in wages). Unlike the case of flexible regular jobs, the gender gap in labor hours also narrows significantly. This reduction occurs because outsourcing alleviates the disproportionate burden of domestic work on women, allowing them to increase their market hours.

7 Conclusion

In this paper, I investigate the barriers to gender convergence, using Japan as a salient environment to explore the interactive effects of labor market structures and social norms. I develop a quantitative model of household labor supply that features a dual labor market characterized by rigid "regular" jobs with convex pay schedules and flexible "non-regular" jobs, interacting with social norms regarding the division of labor and spousal earnings.

The calibrated model successfully reproduces the observed gender gaps across participation, occupation, working hours, and wages, explaining 46.2% of the wage gap. It demonstrates how the interaction of structural rigidity and social norms drives women into lower-paying, flexible non-regular employment.

Counterfactual simulations reveal that while making regular jobs more flexible (linearizing the wage schedule) is effective in closing wage and occupational gaps, it is insufficient to eliminate the gender gap in working hours. As long as social norms compel women to bear the primary responsibility for domestic work, they remain constrained in their labor supply. However, the availability of affordable market substitutes for household production significantly mitigates this constraint, narrowing the labor hours gap and further reducing inequalities.

These findings suggest that completing the "last chapter" of gender convergence requires a two-pronged approach: reforming labor market institutions to eliminate the penalty for flexibility and addressing the unequal burden of domestic work that serves as the source of the gendered demand for that flexibility.

Appendix

A Supplementary Analysis

A.1 Specifications of Discontinuity of Relative Earnings

Figure 7 indicates the gap in the density of share of earnings between husbands and wives. While this graph simply shows the discontinuous behavior of couples in terms of earnings, the 5% binning may be too coarse. I thus conduct the same analysis with 1% binning. In Figure A.1 , we can see discontinuity at 50% of the share of earnings in both specifications. We can also see the mass point at 50% in the 1% binning specification, and the density at exactly 50% is 0.072. The existence of the mass point at 50% is also consistent with the model settings. The utility cost is imposed when a wife earns strictly more than her husband, and they have an incentive to earn the same amount. You can also see Kuehnle, Oberfichtner, and Ostermann (2021) for a more detailed discussion about the mass point at 50% of the share of earnings and the specification of the discontinuity.

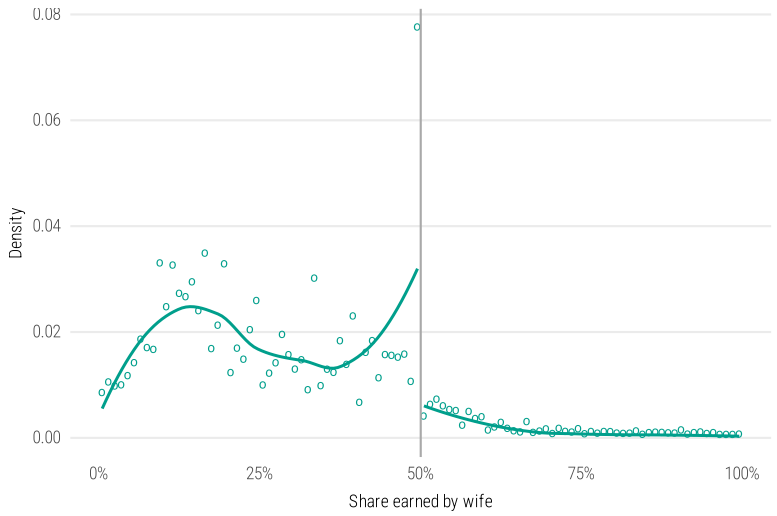


Figure A.1: Distribution of Relative Earnings. The samples are the same as Figure 7 . The figure shows the density of the share of earnings between husbands and wives with 1% binning.

A.2 Specification of Marriage Penalty

Figure 8 shows the event study of the following specification:

$$y_{it} = \alpha_i + \lambda_t + \sum_{k \neq -1, -\infty} \beta_k \mathbb{1}\{e_i + k = t\} + \varepsilon_{it},$$

where α_i is the individual fixed effect, λ_t is the year fixed effect, and e_i is the year of marriage for individual i. The outcome variable y_{it} is log of yearly earnings, share of regular workers, weekly hours worked, and weekly domestic labor hours.

The sample includes people aged between 25 and 59 and observed all years between 2016 and 2023. I use those who got married between 2019 and 2021 as the treatment group to observe

the variables $k = -2, ..., 3$. As a comparison group, I use those who never got married during the sample period.

A.3 Time Allocation in Counterfactuals

Table A.1: Working and Home Hours with Outsourcing d

		Working Hours		Domestic Labor	
Husband	Wife	Husband	Wife	Husband	Wife
Baseline					
Regular	Regular	42.0	35.4	18.7	23.7
Regular	Non-regular	44.9	15.4	11.8	34.7
Non-regular	Regular	23.0	42.5	30.3	15.3
Non-regular	Non-regular	40.0	21.5	15.5	29.9
Flexible Regular Jobs					
Regular	Regular	39.7	24.2	16.2	28.2
Regular	Non-regular	44.4	15.2	11.9	34.5
Non-regular	Regular	31.7	31.2	22.5	23.0
Non-regular	Non-regular	40.5	20.8	14.9	30.3
Outsourcing					
Regular	Regular	52.4	39.8	3.4	8.4
Regular	Non-regular	50.5	25.8	4.2	18.9
Non-regular	Regular	32.0	46.3	15.2	6.3
Non-regular	Non-regular	47.0	27.7	7.5	20.2

Notes: The table compares the allocation of weekly working hours (column 1-2) and domestic labor hours (column 3-4) among the baseline model, the counterfactual economy with flexible regular jobs, and the counterfactual economy with outsourcing.

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