Occupation, Fertility, and Intra-Household Allocation*

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Abstract

This paper investigates the relationship between women's occupational choices and fertility. Using the Japanese Panel Survey of Consumers (1993–2019), we find that across occupations, mean working hours among married women are positively associated with fertility, a pattern that contrasts with the prediction that long working hours pose greater barriers to balance career and family responsibilities. We further document several empirical regularities linking occupational characteristics to intra-household resource allocation: occupations with longer average working hours are associated with a larger share of private consumption within the household and a smaller share of time spent in home production, alongside well-known patterns such as higher hourly wages. Next, we develop a collective model that incorporates occupational choices, fertility choices, and intra-household allocations of time and resources, in which individuals are heterogeneous in fertility preferences and comparative advantage. This paper highlights the role of the household bargaining channel in shaping women's fertility and career choices.

Keywords: Fertility, occupational choices, intra-household allocation, time use

JEL codes: E24, J13, J16

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1 Introduction

Global declines in fertility rates and the rising share of women participating in the labor market are among the most significant demographic and economic trends of recent decades. As a result, reconciling women's family and career goals has become a critical policy priority. A central discussion in this context concerns the inflexibility of working hours in labor markets: high-paying occupations often require long or rigid hours, creating substantial barriers to balancing career and family responsibilities—particularly for women—and thereby contributing to the persistent gender wage gap (Goldin, 2014).

In this paper, we examine how women make choices regarding occupation and fertility—two central dimensions of career and family goals—by addressing the following questions: What are the empirical regularities linking fertility choices with occupational choices? For example, do women in occupations that demand long hours but pay more tend to have lower fertility? And what mechanisms generate these patterns? Understanding these questions is essential for identifying the factors that shape the trade-off individuals—especially women—face between career and family. In turn, this helps inform policies aimed at reducing these frictions and supporting individuals in balancing career and family.

The answers to these questions, however, are not clear-cut. On the one hand, the requirement for long working hours and the high opportunity cost of time in some occupations might be incompatible with childbearing and thus decrease fertility (Jones et al., 2008). On the other hand, several mechanisms could generate the opposite effect. For instance, firms that pay higher wages often provide more non-wage amenities because they have a lower cost of amenity provision (Thomas and Mas, 2025), and these occupations also tend to involve lower unemployment risk, which is associated with higher fertility (Guner et al., 2024). Furthermore, relative wages between partners, shaped by occupational choices, are an important determinant of women's bargaining power (Lise and Yamada, 2019). Since bargaining power governs how households allocate resources, both in terms of consumption and time, women's occupational choices can enhance higher willingness to have children if she has a larger marital surplus, potentially leading to higher fertility rates.

Using the Japanese Panel Survey of Consumers (JPSC, 1993–2019), we define occupations at the industry–occupation cell level, yielding up to 90 potential occupation–industry cells. We document several key empirical findings related to fertility and women's occupational choices. First, there is a positive relationship between the average occupational working hours and occupational fertility rate. Women employed in occupations with longer average working hours tend to have higher birth intensions and higher fertility rates. Second, we divide these occupations into two categories: *linear* and *non-linear* occupations, following the literature (e.g., Erosa et al., 2022). Linear occupations are characterized by lower working hours and lower hourly wages, whereas non-linear occupations are characterized by longer working hours and higher hourly wages. Building on this occupation classification, we show that the relationship between fertility and women's labor supply is asymmetric across the extensive and intensive margins: Next year's birth probabilities are 0.7% lower among women who participate in the labor market compared with non-participants, yet 1.2% higher among women employed in the non-linear occupations compared to the linear ones. Moreover, women engaged in nonlinear occupations exhibit

higher birth intentions and are 4.5% more willing to have children compared to those in linear occupations. This pattern contradicts the predictions of a standard occupational-choice model with endogenous fertility. With heterogeneity in fertility preferences and comparative advantage in different occupations being considered, these models always predict a negative relationship between hours worked and fertility (See Appendix C).

To further investigate the mechanisms behind this positive relationship between hours and fertility, we leverage the unique features of the JPSC dataset, which documents consumption and time allocation in various activities at the individual level within a panel structure, and provides information on salaries and non-wage amenities in the firms women are working at. We find that women working in occupations that require long hours can benefit from both occupational and household perspectives. From the occupational perspective, at the intensive margin, longer working hours are associated with higher wages, lower job loss risk, and better non-wage amenities, such as greater flexibility in taking days off. From the household perspective, women working in nonlinear occupations are more likely to marry partners who also work in nonlinear sectors, leading to higher family earnings. Moreover, compared to women employed in linear occupations, these women obtain a 2.6% higher share of private consumption and a 3.1% lower share of time spent in home production, which reflects their higher bargaining position within the household.

Motivated by these empirical facts, we develop a collective model where individuals make choices in terms of occupation, resource allocations within the household, and number of children. The model incorporates three central channels: occupation-specific amenities, positive assortative matching by occupation, and intra-household allocation. Women choose occupations that require longer hours can benefit from higher wages, which grants her higher probability to meet partners with higher earnings on the marriage market, and greater bargaining power within the household. Furthermore, due to high wages and a high bargaining position, they allocate a larger share of home production to their partners and enjoy more leisure and private consumption. However, women differ in labor productivity and their preferences for children. Therefore, women self-select into occupations depending on how they value career opportunities relative to fertility.

We contribute to several strands of the literature. The first is the literature on women's occupational and fertility choices. Previous studies develop structural models incorporating occupational and fertility choices to estimate the career costs of having children, accounting for skill depreciation resulting from childbirth-related career interruptions and endogenous occupational selection (Adda, Dustmann, and Stevens, 2017; Coskun, Dalgic, and Ozdemir, 2025; Bang, 2022). Relatedly, Cavalcanti, Fernandes, Rachter, and Santos (2025) show that changes in barriers to female labor supply explain a substantial share of the observed shifts in occupational choices, fertility, and income in the U.S. in 1960-2020. Our study contributes to this literature by emphasizing the role of household bargaining channels and the non-wage amenities associated with occupations in shaping women's fertility and occupational choices. Both are positively correlated with high-paying occupations and incentivize women with high fertility preferences and high ability to enter these occupations.

Second, we speak to the literature on analyzing intra-household allocations of time and resources using collective model (Chiappori, 1992; Chiappori and Mazzocco, 2017;

Cherchye et al., 2012; Chiappori, 1988; Lise and Seitz, 2011; Lise and Yamada, 2019). We develop a theoretical framework that connects intra-household resource allocation to women's occupational choices through wages and hours, where occupation-specific wages influence women's bargaining power via a higher wage ratio compared to their husbands, and occupation-specific working hours alter the time endowment women can allocate between leisure and home activities. Using a unique dataset that documents individual private consumption and time use, we first find that women employed in non-linear occupations have a larger share of household consumption and spend less time on home production compared to those in linear occupations. Therefore, when the positive effects on bargaining power are considered, we show that women working in high-paying occupations can also achieve greater empowerment at home.

Our study also relates to the literature on fertility choices and female labor supply. A well-documented empirical pattern shows a positive relationship between total fertility rates (TFR) and female labor force participation (FLFP) across countries—that is, countries with higher FLFP tend to exhibit higher TFR (e.g., Doepke, Hannusch, Kindermann, and Tertilt, 2023). Our study contributes to this literature in two ways. First, we provide new empirical evidence demonstrating a positive relationship between fertility and female labor supply at the intensive margin within a country. This finding is noteworthy because prior work often attributes the cross-country positive relationship to country-specific factors such as social norms or childcare availability (De Laat and Sevilla-Sanz, 2006; Hwang, Park, and Shin, 2018; Ho and Wang, 2024). In contrast, our evidence shows that the positive relationship persists even within a single country, where households face the same institutional and cultural environment. Second, unlike contexts where increases in market childcare are viewed as the primary driver of the fertility–labor complementarity (Bar, Hazan, Leukhina, Weiss, and Zoabi, 2018; Doepke and Kindermann, 2024), which allows high-income mothers to outsource childcare, the Japanese government already provides relatively affordable childcare conditional on maternal employment, and nearly all working mothers use it. As a result, the typical childcare-substitution explanation is less relevant in Japan, making intra-household decision-making particularly central to understanding the observed patterns.[1]

2 Facts

This section presents empirical facts on occupations and their relationships with hours worked, hourly wages, fertility, and intra-household resource and time allocations, using data from the Japanese Panel Survey of Consumers (JPSC). Section 2.1 describes the dataset and outlines the sample selection criteria. Section 2.2 defines the key variables used in the analysis. Section 2.3 then presents our main empirical findings.

[1]Recently, Cruces (2024) documents that the positive relationship between FLFP and fertility also holds within a single country—the United States—and highlights the importance of the increasing availability of infertility treatments.

2.1 Data and Sample

The Japanese Panel Survey of Consumers (JPSC 1993-2019) is a household panel survey conducted by the Panel Data Research Center at Keio University. The survey began in 1993 with a nationally representative sample of 1,500 women aged 24 to 34, and periodically adds birth cohorts of young women approximately every four to five years. By tracking these cohorts annually, the JPSC provides rich longitudinal data on women's life-cycle outcomes. The survey records information on employment and occupations, earnings and household income, marriage and fertility, household consumption and time allocation, and other socioeconomic characteristics.

Occupations We define occupations at the occupation-industry cell level in the JPSC. The occupation classification consists of seven broad groups, and the industry classification includes fifteen categories, generating a total of 90 potential occupation-industry cells. Additional details on the occupation classification scheme, along with descriptive statistics, including average hours worked, hourly wages, and fertility outcomes, are provided in Appendix A.

Fertility and Birth Intentions The JPSC records changes in household size due to childbirth or other reasons during the past 12 months, allowing us to see whether a respondent gave birth in the previous year. We use this information to construct a birth dummy variable for each year t. In addition, our regression analysis includes the number of children a woman has at each point in time, as also reported in the JPSC.

To measure fertility intentions, we use responses to the following survey questions. First, respondents are asked: "*Do you want to have a (or another) child?* with three possible responses: *Yes, at any cost*, *Yes, with a condition(s)*, and *No*. If the respondent answers *Yes*, they are then asked: "*How many more children do you want to have (further)?*". We use these responses to construct a variable measuring the intended additional number of children as a proxy of the birth intention. We assign a value of zero to respondents who answer *No* to the first question.

Consumption and Time Use within Household A notable strength of the JPSC is its information on private consumption by individual household members (e.g., husband, wife, children). More specifically, the JPSC asks respondents to break down their monthly expenditures across five categories: expenses for *all my family*, *me* (wife), *my husband*, *my child(ren)*, and *the other(s)*. We compute the wife's and husband's private consumption as the amounts reported under *me* and *my husband*, respectively.

The JPSC also asks respondents and their spouses to report the time they allocate to daily activities—such as *for work*, *for housekeeping and child care*, and *for hobby, leisure, social interaction, etc.* We refer to these categories as time spent in *work*, *home production*, and *leisure*.

Wages and Non-wage Amenities at Firms The measures of wages come from individual reported monthly income from her work. We compute hourly wages by dividing monthly income by reported working hours.

The measures of amenities are constructed from the following survey questions in the JPSC: "*Regarding the company or job at which you are employed, please rate the extent to which the following statements apply.*" Two statements particularly relevant for fertility decisions are: (1) "*It is easy to continue working after marriage or childbirth*," and (2) "*It is easy to take days off.*" Responses range from 1 ("Definitely") to 4 ("Almost never"). To construct occupation-level measures of job amenities, we average responses across individuals within each occupation and reverse the scale so that higher values correspond to greater ease.

The JPSC asks respondents whether they experienced specific events in the past 12 months, including unemployment, job changes, retirement, serious illness, and others. We measure the probability of job loss as the share of individuals who reported experiencing unemployment (i.e., involuntary job loss) during the previous 12 months.

Sample Selection In the empirical analysis, we restrict the sample to women younger than age 50 across all cohorts. We focus on wage workers and exclude the self-employed. To ensure sufficient sample size and statistical reliability, we restrict the analysis to occupation-industry cells with at least 250 observations, resulting in 27 occupations used in the empirical analysis. Fig 8 in Appendix A presents the 27 occupations along with the number of observations in each cell.

2.2 Variable Construction

We define the key variables used to present our main findings.

Occupational hours worked: Let $h_{i,o,j}$ be the (weekly) hours worked for an individual $i \in I$ aged $j \in J$ in occupation $o \in O$. Here, the set J is given as $J = \{24, 25, \ldots, 49\}$.[2] Also, let $h_{o,j}$ be the mean hours worked for those aged j in occupation o. Then occupational hours worked h_o is defined as follows:

$$h_o = \frac{1}{|J|} \sum_{j \in J} \underbrace{\frac{1}{N_{o,j}} \sum_{i} h_{i,o,j}}_{=h_{o,j}},$$

where $N_{o,j}$ denotes the number of observations at age j within occupation o. This measure h_o represents the occupation-level average of hours worked, computed across age groups while assigning equal weight to each age group.

Occupational fertility: Let $k_{i,o,j}$ the number of birth that a woman $i \in I$ aged $j \in J$ in occupation $o \in O$ will have in age $j+1$. Also, let $k_{o,j}$ be the average number of births at age $j+1$ among those aged j in occupation o. Then an occupational fertility rate k_o is defined as follows:

[2]The lower bound is 24 because the youngest age in the JPSC sample is 24. We set the upper bound to 49, which is the age used as the upper limit in computing total fertility rates, because we are interested in the relationship between the variable and fertility.

$$k_o = \sum_{j \in J} \underbrace{\frac{1}{N_{o,j}} \sum_i k_{i,o,j}}_{=k_{o,j}}$$

The construction of this occupational fertility k_o parallels that of a country's total fertility rate, but is computed within occupations here.

Job characteristics across occupations: We also document labor-market characteristics across occupations, including hourly wages, the probability of job loss, and job amenities (e.g., ease of taking time off). Let $x_{i,o,j}$ be one of these variables for an individual $i \in I$ aged $j \in J$ in occupation $o \in O$. Also, let $x_{o,j}$ be the mean of the variable for those aged j in occupation o. Then the labor market related variable x_o for occupation o is defined as follows:

$$x_o = \frac{1}{|J|} \sum_{j \in J} \underbrace{\frac{1}{N_{o,j}} \sum_i x_{i,o,j}}_{=x_{o,j}}$$

Resource and time allocation within the household: Let $x \in \{c, h\}$ be a variable that represents either consumption or home-production time. We define the wife's consumption and home-production time share conditional on occupation o, following the same procedure used to define occupational hours and wages. First, let $x_{i,o,j}$ be the level of variable x for wife i aged j working in occupation o. Similarly, let $x^h_{i,o,j}$ be the level of variable x for her husband, whose wife is the individual i aged j working in occupation o. We then define the wife's share of variable x within the household as:

$$\tilde{x}_{i,o,j} = \frac{x_{i,o,j}}{x_{i,o,j} + x^h_{i,o,j}}$$

Using this, the proxies for the consumption share and home-production share within the household, conditional on the wife working in occupation o, are given as follows:

$$\tilde{c}_o = \frac{1}{|J|} \sum_{j \in J} \frac{1}{N_{o,j}} \sum_i \tilde{c}_{i,o,j}$$

$$\tilde{h}_o = \frac{1}{|J|} \sum_{j \in J} \frac{1}{N_{o,j}} \sum_i \tilde{h}_{i,o,j}$$

2.3 Key Facts

In this section, we present three sets of key empirical facts for married women across occupations:

1. *Fertility across occupations (Fig 1)*:
    - *Mean hours worked (h_o) are positively associated with fertility rates (k_o)*
2. *Job characteristics across occupations (Figs 2 and 3)*: *Mean hours worked are*

- *positively associated with hourly wage*
- *negatively associated with lower probability of job loss*
- *positively associated with ease of taking time off*

3. *Intra-household resource allocation across occupations (Fig 4)*: *Mean hours worked are*
   - *negatively associated with the home production share ($\tilde{h}_w$)*
   - *positively associated with the consumption share ($\tilde{c}_w$)*

Fertility across occupations: The left panel of Fig 1 presents the relationship between the occupational fertility rate and average occupational working hours. Marker size indicates the number of observations in each occupation, and the dashed line shows the fitted regression line. The positive slope suggests that women employed in occupations with longer average working hours tend to have higher fertility rates in the following year.

One concern is that younger women may be more likely to work in hours-intensive occupations and also have higher fertility potential, which could mechanically generate a positive correlation. In addition, differences across birth cohorts may influence both occupational choices and fertility behavior. To address these issues, Figures 9 and 10 in Appendix B reproduce the same relationship separately by age groups and a birth-cohort group, respectively. The positive association persists among younger women (ages < 31), middle-aged women (ages $31 - 34$), and older women (ages $35 - 39$). Likewise, even when restricting the sample to specific birth cohorts, the relationship remains consistently positive. These patterns show that the observed association is not driven by age composition, cohort effects, or time trends in women's occupational choices. Instead, it reflects a robust positive correlation between occupational fertility rates and average hours worked.

The positive relationship appears not only in realized fertility outcomes but also in fertility intentions—the number of intended additional births—as shown in the right panel of Fig 1. One potential concern is that this relationship may simply reflect differences in birth timing: women in occupations with longer working hours may delay childbirth and therefore have fewer children at a given point in time, which would mechanically increase the number of intended additional births. However, as we show in the regression analysis below, the positive relationship persists even after controlling for covariates such as the number of existing children and her age.

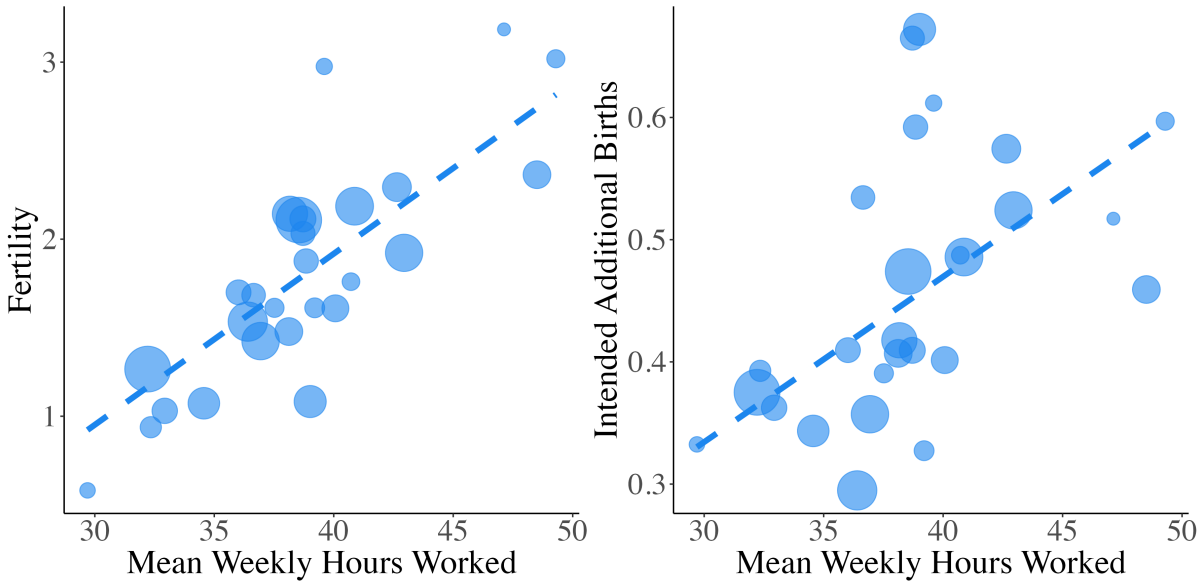


Fig 1: Fertility, fertility intention, and hours worked across occupations.

Wages and amenities across occupations: Fig 2 illustrates the relationship between hours worked and two job characteristics: hourly wages and the probability of involuntary job loss. The left panel of Fig 2 shows a strong positive association between hours worked and wages across occupations. In contrast, the right panel shows a negative relationship between hours worked and the probability of job loss.

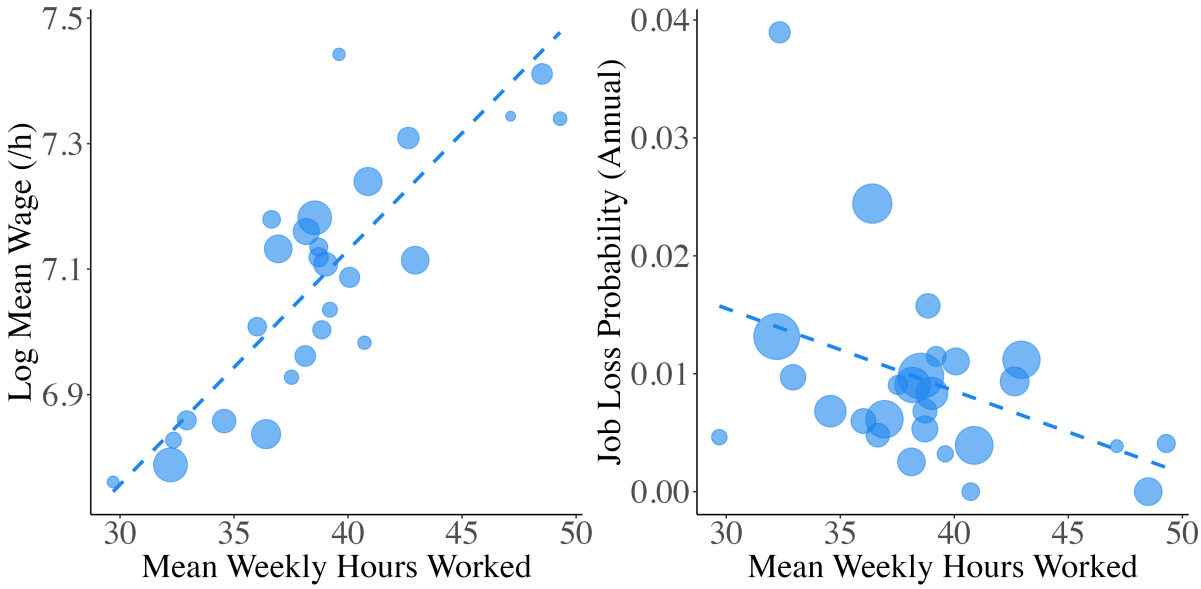


Fig 2: Labor market outcomes and hours worked across occupations

Figure 3 illustrates the relationship between hours worked and non-wage job amenities. The left and right panels of Figure 3 show that both the ease of taking days off and the ease of continuing work after marriage or childbirth are positively associated with hours worked across occupations. This pattern implies that women working in occupations with longer

average hours also benefit from greater job flexibility and supportive workplace policies, which may help reconcile long working hours with family responsibilities.

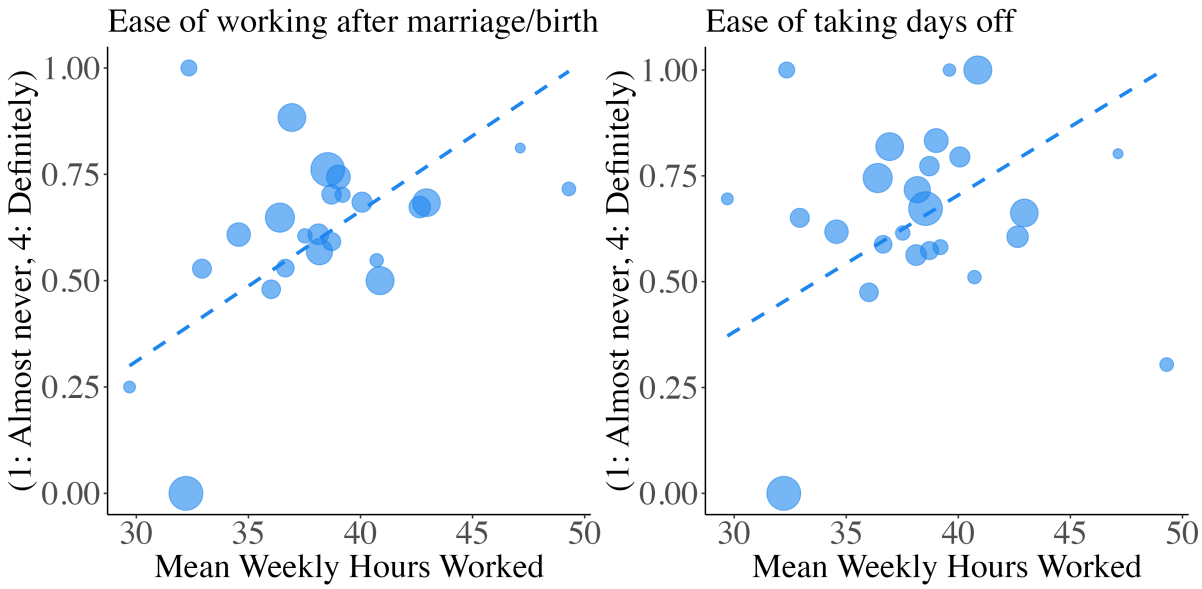


Fig 3: Ease of taking day off and ease of working after marriage or childbirth.

Intra-household resource allocation across occupations: Figure 4 shows the relationship between hours worked and intra-household resource allocations. The left panel indicates that hours worked are positively associated with a woman's consumption share, while the right panel shows a negative association between hours worked and her share of home production time.

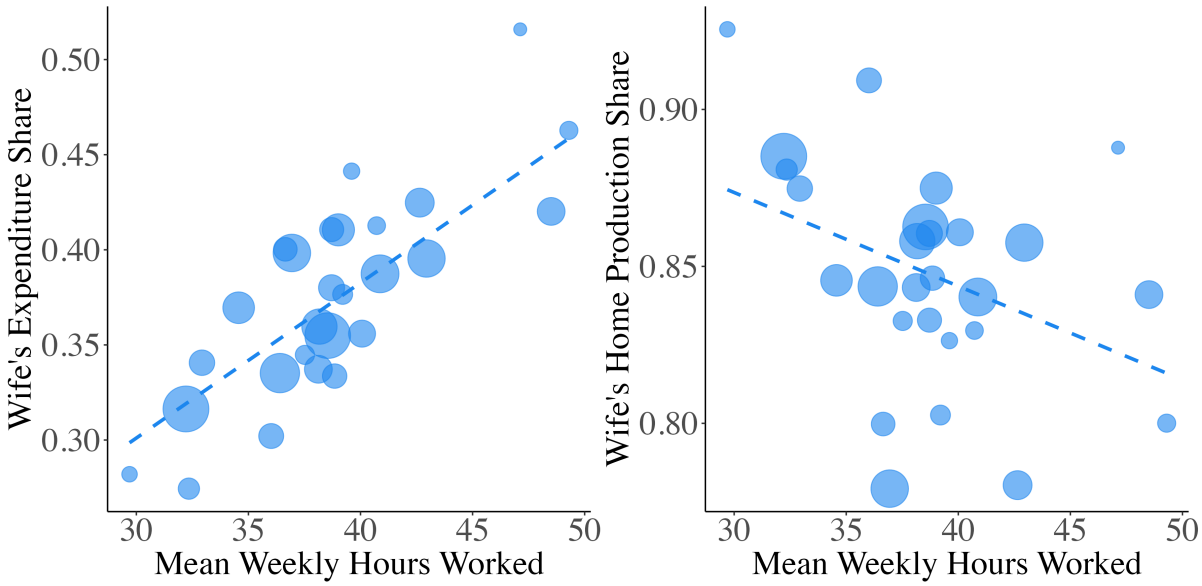


Fig 4: Intra-household allocations and hours worked across occupations.

Regression analysis: Since the female employment rate in Japan is low and child penalties in employment are large (Kleven et al., 2019), it is essential to account for women's non-participation when analyzing how occupational choices shape fertility intentions and outcomes. To compare fertility behavior across the extensive and intensive margins of female labor supply, both in direction and magnitude, we estimate regressions of fertility outcomes on labor-market participation and occupational type.

In what follows, we classify occupations into linear and non-linear types. Linear occupations are characterized by lower wages and shorter working hours, while non-linear occupations feature higher wages and longer working hours. Following the literature (e.g., Erosa et al., 2022; Jang and Yum, 2022), we classify occupation–industry cells into these two groups as follows. First, we rank occupations by mean hours worked. Using occupation size as weights, we divide them into the top and bottom 50% of mean hours. The top half is labeled non-linear, and the bottom half linear. We then construct dummy variables indicating whether a woman is employed and, conditional on employment, whether she works in a linear or a non-linear occupation in year t. We consider two types of comparisons: (1) women not participating in the labor market versus women who participate, and (2) women working in non-linear occupations versus women working in linear occupations. In all regressions, we include the following control variables: age and age squared, birth cohort indicators, number of children, and women's years of schooling. Standard errors are clustered at the individual level. We restrict the sample to married couples to ensure comparability with the analyses of divorce and intrahousehold allocation.

Table 1 reports the results for fertility and divorce. Along the extensive margin, women who participate in the labor market have significantly lower birth probabilities in the following year, while their birth intentions are not statistically different from those of non-participants. This pattern indicates that the physical time demands of paid work crowd out the ability to have a child, even when underlying fertility preferences are similar. Along the intensive margin, however, women working in non-linear occupations exhibit higher birth probabilities and stronger intentions to give birth in the next year. Besides, we also find that divorce rates are positively associated with labor-market participation at the extensive margin, which can be explained by lower marital gains when specialization is reduced.

Table 2 further examines how occupational type relates to private consumption and time use within the household. At both the extensive and intensive margins, women who work, particularly those in non-linear occupations, enjoy a higher share of private consumption and allocate fewer hours to home production. Furthermore, because market work requires time, the wife's share of total household leisure (relative to the couple's combined leisure) declines when she participates in the labor market. However, at the intensive margin, non-linear occupations do not significantly reduce leisure relative to linear occupations. Instead, women appear to substitute home-production hours for market hours without reducing their own leisure. This pattern is consistent with the fact that women in non-linear occupations generally have stronger bargaining power and therefore command a larger share of household resources in both consumption and time use.

Table 1: Women's occupations, fertility, and divorce

	(1)	(2)	(3)	(4)	(5)	(6)
	Birth next year		Birth intention		Divorce next year	
Participation	-0.007*		-0.002		0.009***	
	(0.003)		(0.011)		(0.001)	
Non-linear occupation		0.012**		0.045***		-0.003
		(0.004)		(0.014)		(0.002)
Constant	1.501***	1.403***	2.154***	2.332***	0.102***	0.139**
	(0.064)	(0.091)	(0.146)	(0.187)	(0.029)	(0.045)
Age and Year of Birth	✓	✓	✓	✓	✓	✓
Number of children	✓	✓	✓	✓	✓	✓
Years of schooling	✓	✓	✓	✓	✓	✓
Sample mean of the outcome	0.061	0.052	0.397	0.379	0.010	0.014
R-squared	0.097	0.102	0.404	0.447	0.006	0.007
Observations	22,859	12,661	17,636	10,191	24,255	13,233

Note: Note: JPSC 1993-2019. Women aged 24-49. Standard errors are shown in parentheses. * $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$

Table 2: Women's occupations and intra-household allocation

	(1)	(2)	(3)	(4)	(5)	(6)
	Wife's expenditure share		Home hours share		Leisure hours share	
Participation	0.081***		-0.051***		-0.071***	
	(0.006)		(0.004)		(0.005)	
Non-linear occupation		0.026**		-0.031***		-0.010
		(0.008)		(0.006)		(0.006)
Constant	0.178*	0.329***	1.040***	0.930***	0.215***	0.427***
	(0.069)	(0.097)	(0.043)	(0.069)	(0.065)	(0.081)
Age and Year of Birth	✓	✓	✓	✓	✓	✓
Number of children	✓	✓	✓	✓	✓	✓
Years of schooling	✓	✓	✓	✓	✓	✓
Sample mean of the outcome	0.300	0.343	0.863	0.841	0.426	0.401
R-squared	0.084	0.061	0.096	0.099	0.056	0.035
Observations	20,897	11,336	22,828	12,485	22,199	12,192

Note: Note: JPSC 1993-2019. Women aged 24-49. Standard errors are shown in parentheses. * $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$

3 The Model

In this section, we develop a static model of occupational choice and fertility decisions that incorporates household bargaining. The model incorporates three central channels: occupation-specific amenities, positive assortative matching by occupation, and intra-household allocation.

The model consists of three stages. In the first stage, individuals choose occupations. In the second stage, men and women are matched in the marriage market. In the third stage, married households allocate resources to maximize household welfare. The model is solved by backward induction.

3.1 Third stage: Household maximization problem

Given that the woman works in occupation j, her working hours are h_W^j and her wage is $w_W^j = w_W^j(a_j, h_W^j)$, both of which are exogenous at this stage. Women's bargaining power depends on the relative wages between partners and therefore on occupation j:

$$\mu^j = \mu\left(\frac{w_W^j}{w_H}\right), \tag{1}$$

where w_H denotes her husband's wage. For simplicity, we omit the occupation index j below.

A household consists of two members, $g \in \{W, H\}$. The utility of household member g is

$$u_g(c_g, l_g, n) = \frac{c_g^{1+\eta}}{1+\eta} + \alpha_\ell \frac{\ell_g^{1+\gamma}}{1+\gamma} + \alpha_n \frac{n^{1+\kappa}}{1+\kappa} \tag{2}$$

The household makes efficient decisions by maximizing a weighted average of the spouses' utilities:

$$\max_{c_W, c_H, \ell_W, \ell_H, n} \mu u^W(c_W, \ell_W, n) + (1-\mu) u^H(c_H, \ell_H, n) \tag{3}$$

The household budget constraint is

$$c_W + c_H + e + (\ell_W + q_W)w_W + (\ell_H + q_H)w_H = w_W + w_H + Y$$

where Y is non-labor income and e is child-related expenditure.

Each individual has a time endowment of 1, and the time constraint is

$$h_g + \ell_g + q_g = 1 \tag{4}$$

where q_g represents hours spent on home production, and ℓ_g is leisure.

Following Myong et al. (2021), the total amount of childcare required to raise n children is

$$F(n) = \phi n \tag{5}$$

and home production process follows

$$A^M(p_H q_H^\psi + p_W q_W^\psi)^{\frac{1}{\psi}} = F(n) \tag{6}$$

where p_g denotes the relative home productivity of individual g.

The household maximization problem highlights several key features: First, given $\psi \leq 1$, the spousal home production share $\frac{q_W}{q_H}$ are decreasing functions of their relative wages and increasing functions of their relative home productivity:

$$\left(\frac{q_W}{q_H}\right) = \left(\frac{w_W}{w_H}\frac{p_H}{p_W}\right)^{\frac{1}{\psi-1}} \equiv k.$$

which implies that women in non-linear occupations can allocate a larger share of home-production responsibilities to their partners. However, the extent to which they are able

to do so depends on their relative productivity in home production, which reflects both women's comparative advantage at home and prevailing social norms.

Second, a higher bargaining weight μ for the wife increases her share of private consumption and leisure relative to her husband. For given occupation-specific working hours h_W^j, a woman with higher bargaining power optimizes at a point where her marginal utility of leisure or private consumption is lower, implying she consumes more leisure and enjoy a larger share of household resources.

$$\frac{c_W}{c_H} = \left(\frac{1-\mu}{\mu}\right)^{\frac{1}{\eta}}.$$

$$\frac{\ell_W}{\ell_H} = \left(\frac{1-\mu}{\mu} \cdot \frac{w_W}{w_H}\right)^{\frac{1}{\gamma}}.$$

3.2 Second Stage: Marriage Market Matching

In the second stage, men and women select their partners by maximizing the value of marriage. Following Calvo et al. (2021), for a woman of type a_W^j, the value of marrying a man of type a_H^j is determined by the household maximization problem in stage 3, where the bargaining weight $\mu(a_W^j, a_H^j)$ between partners is endogenously determined in marriage-market equilibrium. Thus, each woman of type a_W^j chooses the partner a_H^j who yields the highest utility for her.

To capture frictions in the marriage market, we assume that individuals are more likely to match with partners of the same ability type. This implies that working in a high-wage occupation increases a woman's expected gains from marriage, as it raises the probability of matching with a higher-earning partner. Moreover, women with higher wages are more selective in choosing partners and enjoy greater bargaining power within marriage due to their higher earnings potential.

3.3 First stage: Occupational choices

The occupational model follow Erosa et al. (2022). Individual i is endowed with $(\{a_{ij}\}_{j\in J}, \alpha_n^i)$, where a_{ij} denotes the productivity of individual i if she works in occupation $j \in J$. Therefore, $\{a_{ij}\}_j$ informs us of her comparative advantages. α_n^i denotes the preference parameters on the number of children, which varies across households. The higher α_n^i is, the more she derives utility from having children. Let $\mathbf{\Theta}_i = (\{a_{ij}\}_{j\in J}, \alpha_n^i)$ and let $F(\mathbf{\Theta}_i)$ denote the joint distribution of individuals characterized by the parameter vector $\mathbf{\Theta}_i$.

The labor earnings for individual i working in occupation j is given as

$$w_i^j = a_{ij} h_{ij}^{1+\theta_j} \tag{7}$$

where h denotes working hours, and $\theta_j \geq 0$ governs the convexity of earnings for occupation j.

Given the optimal choices over consumption, time allocation, and fertility, conditional on working in occupation j, each individual j attains a maximized utility level $\{u_i(j)\}_{j\in J}$. At this stage, individuals choose an occupation j^* such that the utility from choosing j

is at least as large as the utility from choosing any alternative occupation j':

$$j^* = \arg\max \{u(j)\}_{j \in J}$$

Suppose that $\theta_j > \theta_{j'} \geq 0$, meaning that the occupation j exhibits more convexity in earnings technology (say, occupation j is some "professional" occupations such as doctor and lower, and occupation j' is some blue-collar occupation).

We specify the key tradeoffs that women face at the first stage. Women with higher occupational ability are more likely to select into occupations with higher θ_j, thereby receiving higher wages $w_i^j > w_i^{j'}$. The higher earnings increase household income and women's relative wage within the household, and thus their intrahousehold bargaining weight. Stronger bargaining positions raise women's marital surplus and may increase their willingness to have children, as they can negotiate for higher private consumption and leisure. However, nonlinear occupations also require longer working hours $h_i^j > h_i^{j'}$. Let $\bar{\alpha}_n(j)$ denote the fertility preference threshold above which the household optimally chooses a higher number of children. Families with $\alpha_n^i < \bar{\alpha}_n(j)$ will instead choose fewer children because the time cost of childrearing becomes too high relative to the returns from career investment.

In summary, individuals self-select into occupations depending on how they value career opportunities relative to fertility. Occupational sorting interacts with household decisions because couples must negotiate fertility choices when partners differ in labor-market productivity, home productivity, and fertility preferences.

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A Descriptive statistics by occupation

Occupation classification: As explained in the main text, we classify occupations based on occupation-industry cells in the JPSC. Because our analysis focuses only on employed workers, we use six occupational categories and fifteen industry categories, yielding a total of 90 potential occupation-industry cells.

The occupation classification in the JPSC consists of seven broad groups: (1) *Management*; (2) *Other professional* (hospital doctor, researcher, professor, assistant professor or tutor in a university or college, judge); (3) *Technical employee* (engineer, technician, programmer, medical nurse, dietitian, pharmacist); (4) *Teacher* (primary, junior-high, or senior-high school teacher, or teacher in a special or professional school, kindergarten, or day nursery); (5) *Clerical employee* (general clerk, business employee, bank clerk); (6) *Skilled employee* (skilled worker, police officer, delivery worker, motorman, artisan, cleaner); and (7) *Sales and service employee* (shop employee, salesperson, barber or hairdresser, chef, assistant nurse, care staff).

The industry classification includes fifteen categories: (1) *Agriculture and forestry*; (2) *Fishing and fisheries*; (3) *Mining and quarrying*; (4) *Construction*; (5) *Manufacturing*; (6) *Electricity, gas, heating supply, and water supply*; (7) *Telecommunications*; (8) *Transportation*; (9) *Wholesale and retail* (including supermarkets and convenience stores); (10) *Finance, insurance, and real estate*; (11) *Lodging, food, and beverage services*; (12) *Education and education assistance*; (13) *Medical and social services*; (14) *Other industries* (cosmetics, advertising, entertainment, postal services, employment placement or temporary agency work); and (15) *Public affairs* (government agencies, public offices).

Because we restrict attention to occupation-industry cells with at least 250 total observations, the scatter plots in Section 2 are based on 27 such cells.

Basic statistics across these occupations, including mean hours worked, mean hourly wage, average fertility, and the number of observations, are presented in Fig 5-8.

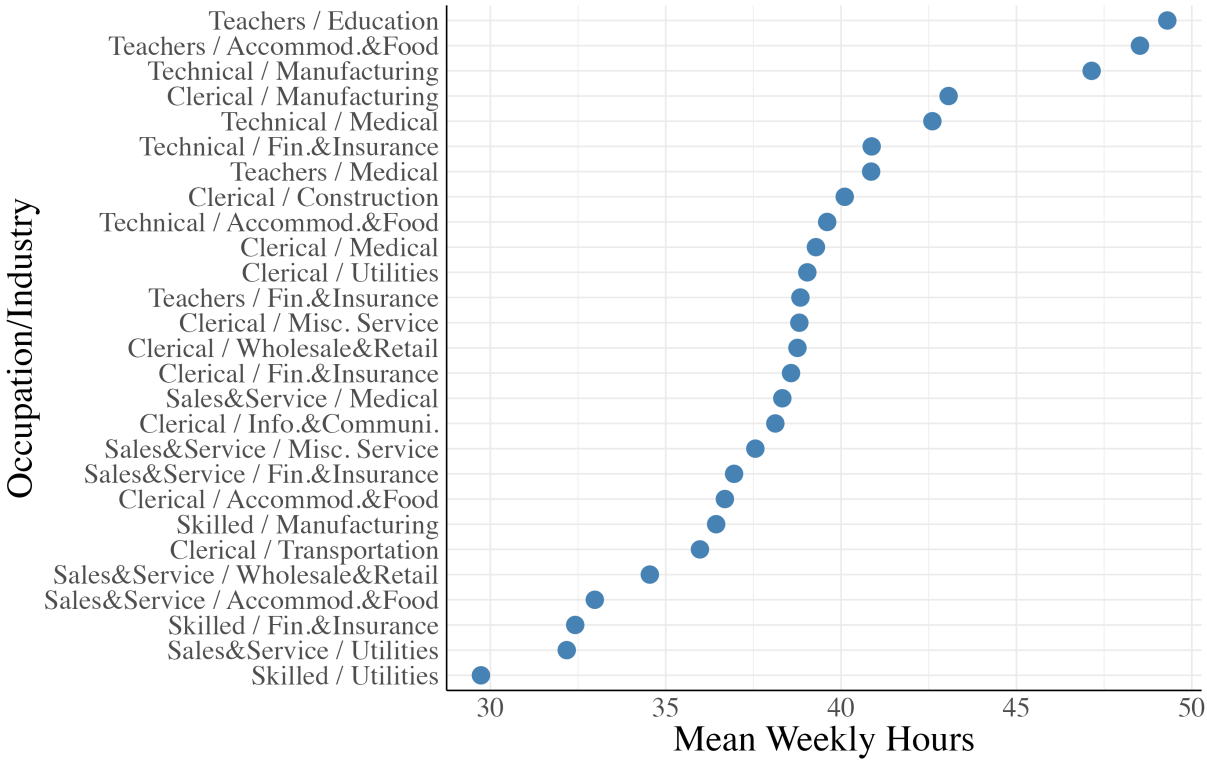


Fig 5: Mean hours worked across occupations.

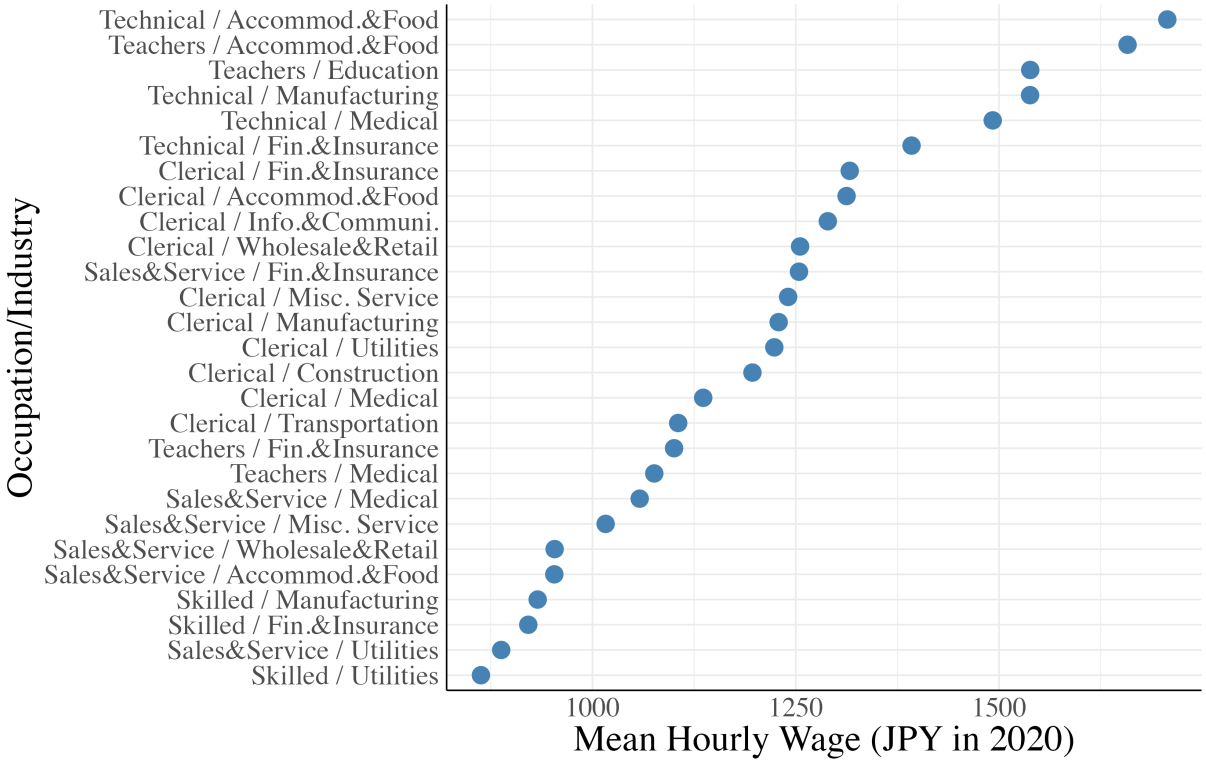


Fig 6: Mean hourly wages across occupations.

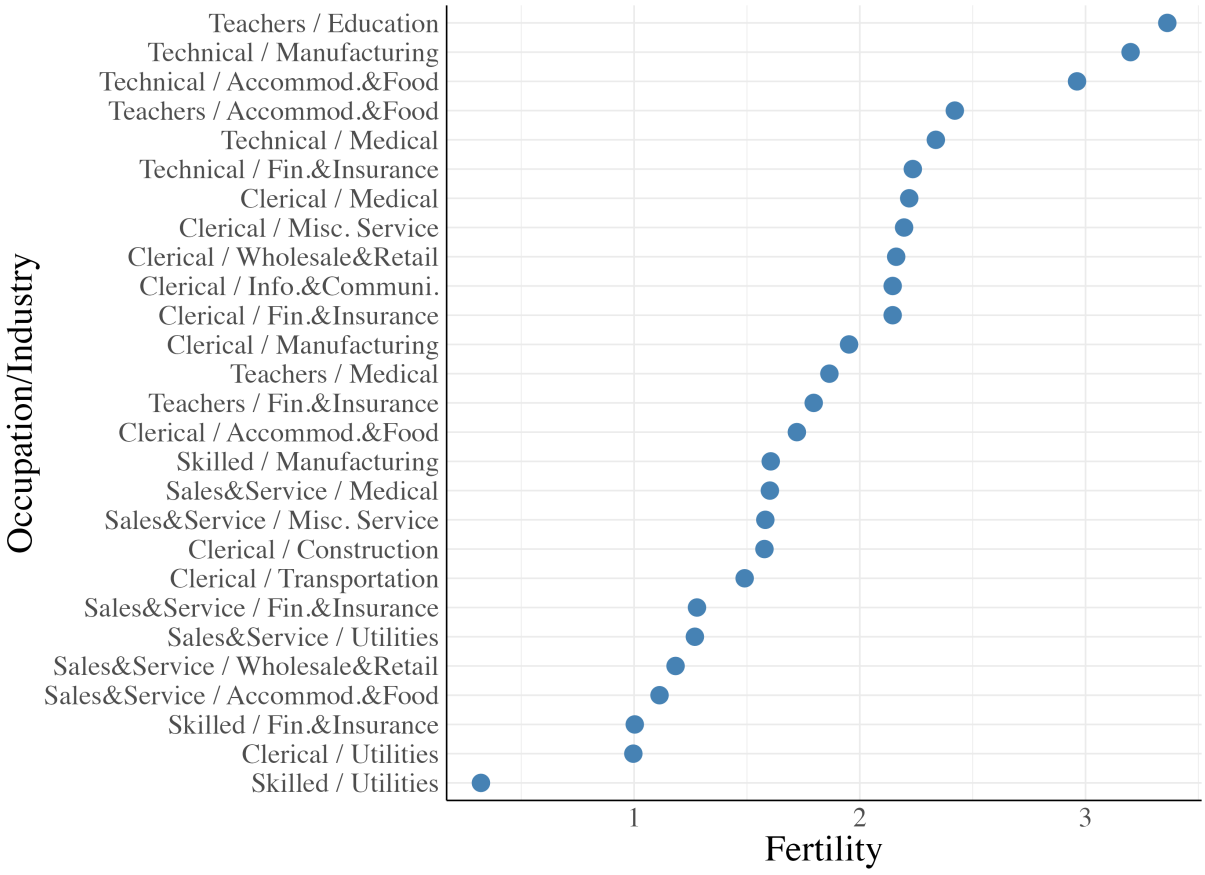


Fig 7: Fertility across occupations.

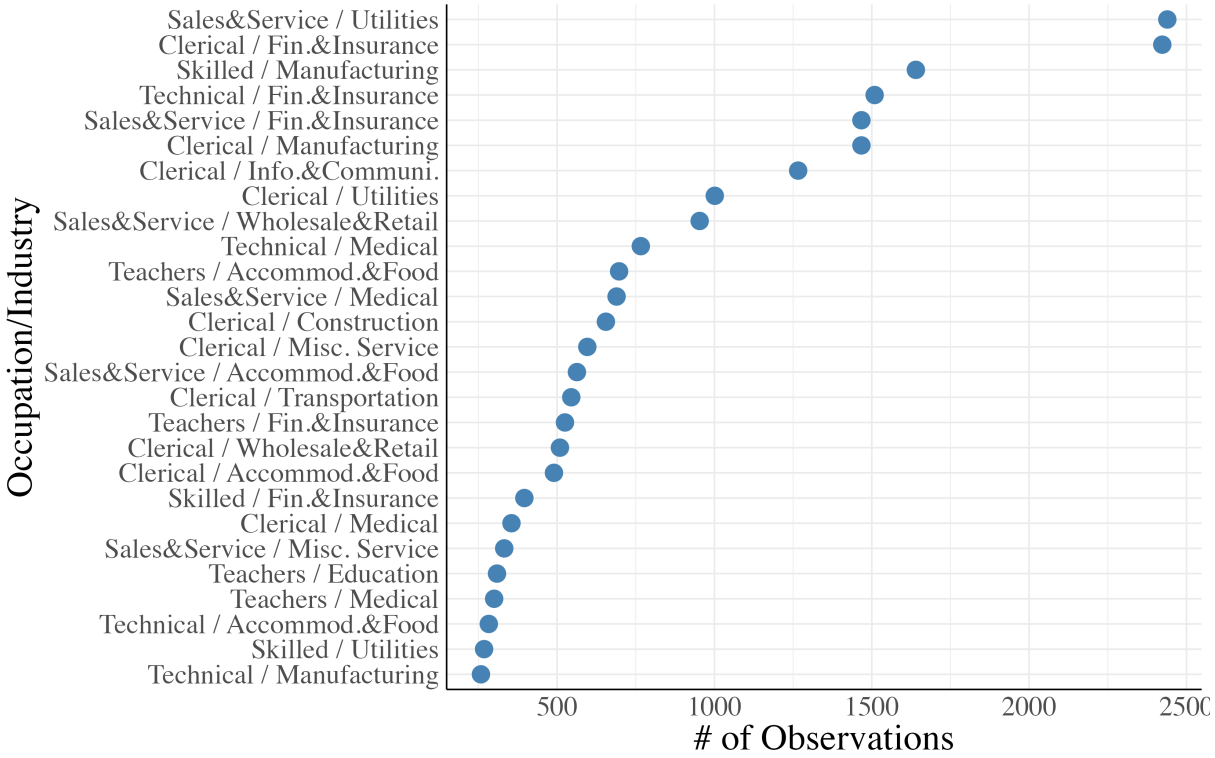


Fig 8: The number of observations across occupations.

B Further Analysis



Fig 9: Fertility and working hours across occupations and age groups.

Fig 10 plots occupational fertility and hours worked, restricting the sample to women born between 1959 and 1969—the oldest cohorts in the JPSC and those who are over age 49 by 2019. Aside from adding the cohort restriction, we apply the same sample criteria as before, including the requirement of at least 250 observations per occupation cell. As a result, the number of plotted points is smaller than in Fig 1, and several occupations display a fertility rate of zero due to small sample sizes.

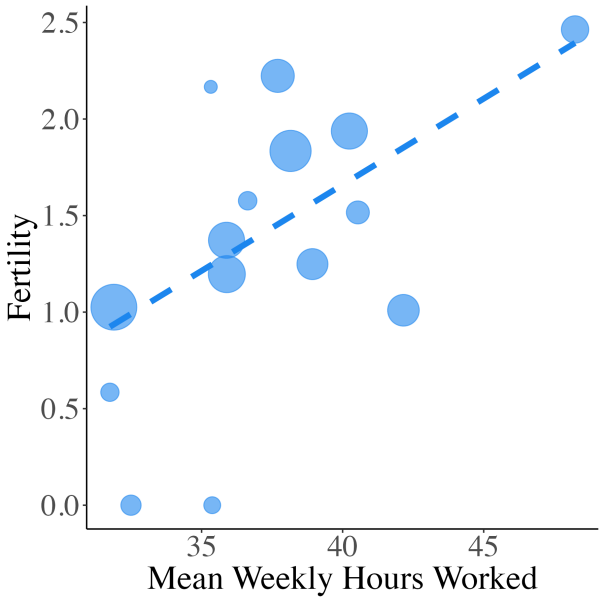


Fig 10: Fertility and working hours across occupations in 1959-69 cohorts.

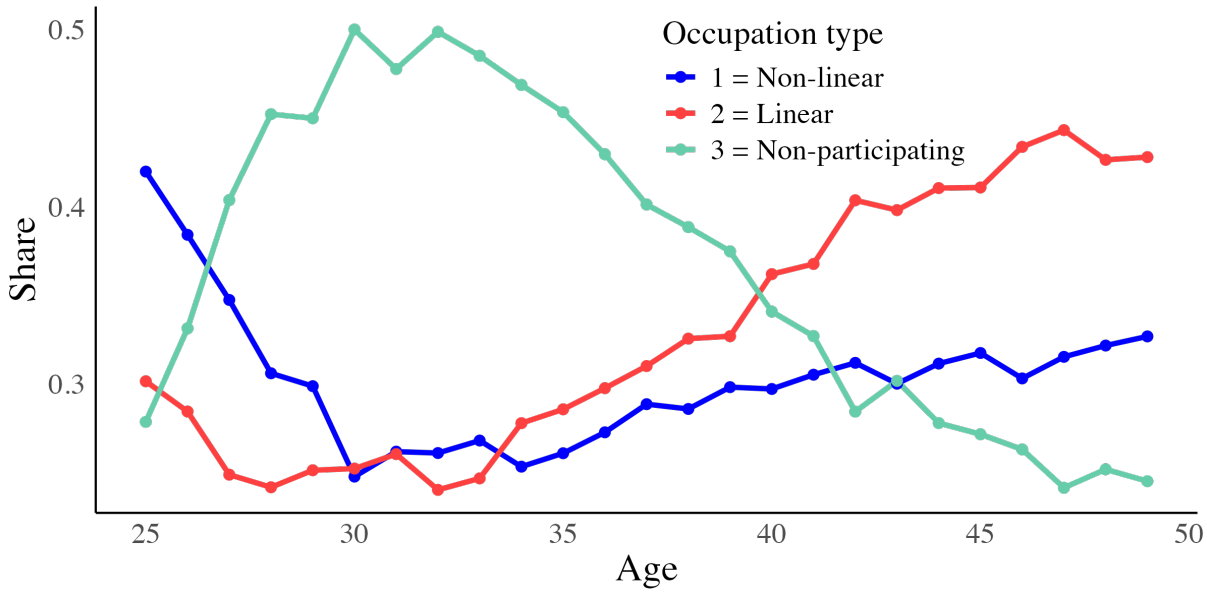


Fig 11: Women's occupation distribution over the lifecycle (cohort born in 1959-69).

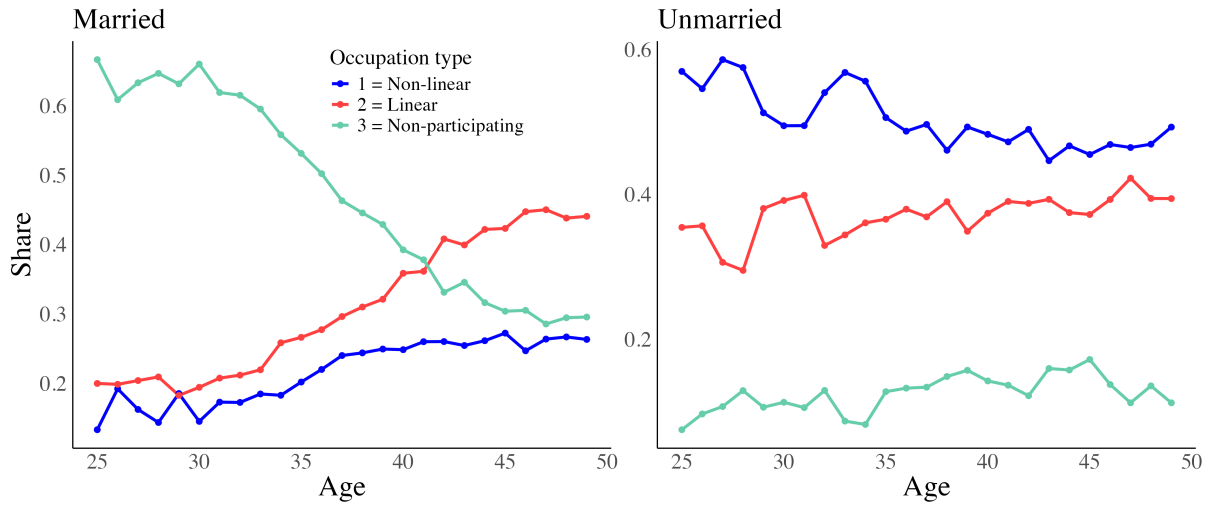


Fig 12: Women's occupation distribution over the lifecycle (cohort born in 1959-69), conditional on marital status.

C A Roy Model with Fertility Choices

This section discusses whether the positive relationship between working hours and fertility across occupation results. To this end, I incorporate fertility choices into a model of occupational choices developed by Erosa, Fuster, Kambourov, and Rogerson (2022), a variant of Roy (1951) model.

In this model, individual i makes choices over consumption (c), the number of children (k), and occupation (j). Individual i is endowed with $(\{a_{ij}\}_{j\in J}, \gamma_i)$, where a_{ij} denotes the productivity of individual i if she works in occupation $j \in J$. Therefore, $\{a_{ij}\}_j$ informs us of her comparative advantages. γ_i denotes the preference parameters on the number of children. The higher γ_i is, the more she derives utility from having children. Let $\mathbf{\Theta}_i = (\{\alpha_{ij}\}_{j\in J}, \gamma_i)$ and let $F(\mathbf{\Theta}_i)$ denote the joint distribution of individuals characterized by the parameter vector $\mathbf{\Theta}_i$.

The labor earnings for individual i working in occupation j is given as $h_{ij}^{1+\theta_{ij}}$ where h denotes working hours, and $\theta_{ij} = \alpha_{ij} \times \theta_j \geq 0$ governs the convexity of earnings for occupation j.

Having children is costly in terms of time and needs a T fraction of her time per child, reducing her working hours. They spent all the income to consumption.

The maximization problem for individuals can be solved in two stages. In the first stage, I solve the optimal choices over consumption, fertility, and hours worked, provided that she works in occupation j, which gives as the maximized utility for individual i with occupation j, $\{u_i(j)\}_{j\in J}$. In the second stage, they choose the occupation j that brings her the highest utility:

$$\max_{j\in J} \{u_i(j)\}_{j\in J}.$$

The first stage: In this stage, individual i makes choices over consumption, the number of children, and hours worked, given that she is working in occupation j. Let choice variables x_{ij}, where $x \in \{c, k, h\}$, be the one made by individual i in occupation j. The problem reads as:

$$\begin{aligned} &\max_{c_{ij}, k_{ij}} \{\ln c_{ij} + \gamma_i \ln(k_{ij})\} \\ \text{s.t.} \\ &c_{ij} = (1 - Tk_{ij})^{1+\theta_{ij}} \end{aligned}$$

The optimal choices (k_{ij}, h_{ij}) and the implied hourly wage w_{ij} are given as follows:

$$h_{ij} = \frac{1+\theta_{ij}}{1+\theta_{ij}+\gamma_i}, \; k_{ij} = \frac{\gamma_i}{(1+\theta_{ij}+\gamma_i)T}, \text{ and } w_{ij} = \left(\frac{1+\theta_{ij}}{1+\theta_{ij}+\gamma_i}\right)^{\theta_{ij}}.$$

The second stage: The solution for the first stage gives us the maximized utility for individual i in occupation j, $u_i(j)$ for $j \in J$. Individual i chooses occupation j^* if the utility they obtain when they choose occupation j is greater than the utility they obtain when they choose any other occupation j':

$$j^* = \arg\max \{u(j)\}_{j \in J}$$

We then obtain the following proposition.

Proposition 1 (Non-positive relationship between hours worked and fertility)**.** *Take any two individuals i and i' drawn from the distribution $F(\boldsymbol{\Theta}_i)$ such that the individual i works longer than i' does:*

$$h_{ij} \geq h_{i'j'},$$

where j and j' denote their optimal occupations for individuals i and i'. Then, such an individual i has always fewer children than i' does:

$$k_{ij} \leq k_{i'j'}$$

This implies that the hours worked and fertility are either negatively associated or independent of one another.

Proof. For such a pair of (i, i'), take the ratio of their hours worked and fertility as follows:

$$\frac{h_{ij}}{h_{i'j'}} = \frac{1+\theta_{ij}}{1+\theta_{i'j'}} \times \frac{1+\theta_{i'j'}+\gamma_{i'}}{1+\theta_{ij}+\gamma_i} \tag{8}$$

and

$$\frac{k_{ij}}{k_{i'j'}} = \frac{\gamma_i}{\gamma_{i'}} \times \frac{1+\theta_{i'j'}+\gamma_{i'}}{1+\theta_{ij}+\gamma_i} \tag{9}$$

Note that for the hours ratio in equation (8) to be greater than one (i.e., individual i works longer than i' does), $(\theta_{ij}, \theta_{i'j'})$ must hold that:

$$\theta_{ij} > \frac{\gamma_i}{\gamma_{i'}}\theta_{i'j'} + \frac{\gamma_i - \gamma_{i'}}{\gamma_{i'}}. \tag{10}$$

Also, for the fertility ratio in equation (9) to be greater than one (i.e., individual i has more children than i' does), $(\theta_{ij}, \theta_{i'j'})$ must hold that:

$$\theta_{ij} < \frac{\gamma_i}{\gamma_{i'}}\theta_{i'j'} + \frac{\gamma_i - \gamma_{i'}}{\gamma_{i'}}. \tag{11}$$

Because the inequalities (10) and (11) do not hold at the same time, the positive relationship between hours worked and fertility across occupations does not result. Because this holds for any pair of individuals (i, i'), we obtain the stated result.

□