Parental Leave Policies, Fertility, and Labor Supply*

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Abstract

South Korea faces persistently low fertility rates and large gender gaps in labor supply. Under traditional gender roles, more generous parental leave makes it difficult to narrow gender gaps while increasing fertility. To examine how recent reforms operate beyond these static channels, we develop a dynamic, heterogeneous-household life-cycle model in which couples jointly choose careers, labor supply, savings, childcare, and fertility. The model is calibrated to recent Korean cohorts and incorporates Korea's segmented labor market, where career-oriented jobs are inflexible and involve high entry costs. Our quantitative results show that generous parental leave benefits can raise fertility and reduce gender gaps in labor supply and wages over the life cycle. These dynamic effects arise because parental leave job protection allows more women to remain in career-oriented jobs during childrearing years, enabling long-term career progression. Without job protection or segmented markets, this career-retention channel weakens and policy effects diminish or reverse.

Keywords: Parental Leave, Birth Rates, Labor Supply, Gender Gaps, Segmented Labor Market, Job Protection, Inflexible Jobs.

JEL codes: E24, J22, D13, J13, J16.

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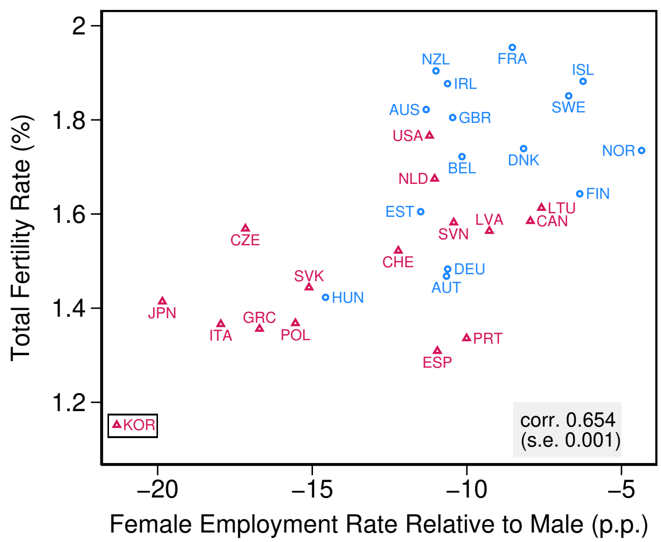
1 Introduction

South Korea (hereafter Korea) faces two stark and interrelated challenges: low fertility and large gender gaps in labor supply. Fertility rates in Korea have remained persistently low for several decades, while Korea continues to exhibit the highest gender gap in labor supply among developed countries. Figure 1 illustrates these patterns by plotting female employment rates relative to male employment against the total fertility rate, both averaged over the past decade (2010–2019). The two variables are strongly positively correlated across countries, with Korea standing out starkly in the bottom-left corner of the figure, highlighting the magnitude of these concerns for Korean society and policymakers.[1]

Figure 1: Gender Gaps in Labor Supply and Fertility Across Countries



Notes: The x-axis shows the employment rate gap (%) between working-age females and males within the same subgroup, while the y-axis represents the total fertility rate. Countries are categorized into two groups based on public expenditure on family benefits (as a percentage of GDP): blue circles denote high expenditure (ranks 1–15), and red triangles indicate low expenditure (ranks 16–31). Data represent country averages over the period 2010–2019. Source: OECD.

In response to these challenges, the Korean government has recognized the need to expand family policies and, in particular, views parental leave (PL) as a key instrument

[1]Although Figure 1 is inspired by Doepke et al. (2023), who highlight that the relationship between female participation rates and fertility has shifted from negative to positive, our figure offers unique value for two reasons. First, South Korea was not included in their changing relationships. Second, while they plot female labor supply, we plot gender gaps. Since countries may have distinct institutional and cultural factors that influence both male and female labor supply, the positive correlation in Figure 1 is more pronounced than when using female labor supply alone, as illustrated in Appendix Figure A1.

to address them simultaneously.[2] In recent years, the government has implemented substantial reforms, shifting from a low, flat benefit to a generous earnings-dependent system with gradually increasing caps and incentives for couples' joint use.

How effective are these PL policies in increasing fertility and narrowing large gaps in labor supply? What mechanisms drive these policy effects, whether successful or not? While a sizable empirical literature examines PL reforms, these studies are conducted in countries with differing underlying institutions, often yielding mixed results.[3] Because differences in estimated effects may partly reflect these institutional features, such as labor market structures, quantitative theoretical analysis can be particularly valuable yet remains limited in the existing literature, as emphasized by Doepke et al. (2023). This paper provides such a theoretical and quantitative analysis of PL policies to investigate these questions.

To highlight a conventional mechanism that can arise in models of PL, we begin with a simple static framework that captures the core time-allocation trade-offs shaping fertility and female labor supply responses to PL policies. In this setting, we show that more generous PL benefits—which effectively act as a subsidy to non-working time for parents—may be inherently unable to simultaneously increase fertility and reduce gender gaps in labor supply. While this static framework clarifies an important force relevant to many PL environments, it cannot capture how PL interacts with segmented dual labor markets—a salient feature of Korea (Schauer, 2018)—in which high-paying career-oriented jobs are difficult to enter and inflexible, with important implications for career trajectories and long-term labor supply. These considerations require a richer, dynamic life-cycle model.

Our quantitative model explicitly allows couples to make joint decisions about labor supply and PL while considering their future career prospects within an otherwise standard life-cycle framework with endogenous fertility. The fertility component of the model follows the tradition of Becker and Tomes (1976), where parents value both the quantity and quality of children. Additionally, the model incorporates features that link fertility choices to relevant factors, including childcare requirements for newborns and the added burden on working mothers. These factors impose both financial and time constraints on parents, influencing their fertility and labor supply decisions.

Given the relatively low share of PL use, we introduce PL choice by both mothers

[2]In line with Olivetti and Petrongolo (2017), the positive relationship in Figure 1 is also shaped by family policies, as evidenced by the fact that countries with higher public expenditure on family benefits (as a percentage of GDP) appear in the upper-right corner (blue circles).

[3]See empirical studies on the PL effects on fertility (Dahl et al., 2016, Malkova, 2018, Farré and González, 2019, Raute, 2019) and female labor supply (Lalive and Zweimüller, 2009, Kleven et al., 2024).

and fathers as a key decision in our model, shaped by the major benefits and costs of taking leave. On the benefit side, parents value the additional time spent with children. A central advantage of PL in a dynamic environment is job protection: PL allows parents to remain in inflexible, career-oriented jobs while temporarily working fewer hours, thereby preserving their job quality upon returning from leave. This job-security role is a central mechanism embedded in our dynamic quantitative model. On the cost side, we model two key dynamic forces. First, because current labor supply generates future career returns in the spirit of Imai and Keane (2004), parents anticipate that taking PL may slow career progression. Second, we include nonpecuniary stigma costs to reflect the widely recognized discomfort—especially among men—associated with taking PL (Kim and Lundqvist, 2023).

The job-protection role of PL may be especially important in Korea's segmented labor markets. Accordingly, we introduce dual labor markets with two job types—regular and nonregular—with frictions that limit transitions into regular jobs. Regular jobs offer several advantages, including higher wages, greater job stability, and promotion opportunities. However, these career-oriented jobs are costly to enter and, importantly, less flexible, requiring long working hours and uninterrupted employment to sustain career progression.

We calibrate the model using longitudinal data from women born between 1970 and 1975 and their family members in the Korean Labor and Income Panel Study (KLIPS), who experienced the old regime of low, flat PL benefits during their main childbearing years. Our calibrated model successfully replicates the observed life-cycle patterns of labor supply, job types, wages, and fertility choices for both female and male household members. In particular, our calibrated model captures the marked and persistent decline in women's regular-job employment around childbirth, in contrast to the relatively stable patterns observed for men.

Using the calibrated model, we evaluate two recent versions of substantially more generous PL policies. We find that these policies, whether implemented through a shift to an earnings-dependent system with a high replacement rate of 80% or through even higher benefit caps, can persistently narrow gender gaps in labor supply over the life cycle while also raising completed fertility to a quantitatively meaningful extent (close to 10%). Notably, they increase women's *lifetime* labor supply, despite the short-run labor supply costs of having children. In our dynamic framework, the job-protection role of PL, combined with segmented labor markets, allows women to better balance career and family over time, with more generous PL benefits inducing more women to enter and remain in regular jobs.[4] These sustained improvements in women's career trajectories also contribute to narrowing gender wage gaps over the life cycle.

To illustrate and quantify the importance of job protection and labor market segmentation in driving our results, we conduct two key counterfactual exercises. In the first, we shut down the job-protection role of PL; in the second, we relax labor market frictions by removing the entry costs to regular jobs.[5] In both cases, the positive fertility effects of more generous PL benefits become substantially weaker, and in the latter case, women's lifetime labor supply even decreases. Together, these counterfactuals show that the career-retention channel operates strongly only when PL provides job protection in a segmented labor market, and that removing either element substantially alters the policy's effects on fertility and gender gaps.

Finally, we repeat the same policy experiments in economies adjusted to reflect recent developments in Korea, including rising demand for private education spending, fewer children at early ages, and more egalitarian gender norms in childcare. These adjustments shift the baseline model toward patterns consistent with the declining fertility rates and increasing female labor supply observed in recent years. Across these alternative environments, however, we find that our benchmark quantitative results on the effects of more generous PL policies remain broadly similar.

As highlighted by Doepke et al. (2023), the literature lacks quantitative theoretical analyses of PL. Notable exceptions include Erosa et al. (2010), who examine its welfare implications, with bargaining dynamics as the key mechanism. Our focus on couples' joint labor supply and career concerns over the life cycle (Borella et al., 2022, Guner et al., 2023), along with the analysis of various PL policies—including changes in benefit schemes, caps, and joint-use incentives—is novel and distinguishes our work in the literature.[6] Since fertility and life-cycle labor supply are central choices, our paper also relates to quantitative studies using structural models of endogenous fertility and labor supply but without PL decisions (Bick, 2016, Greenwood et al., 2016, Daruich and

[4] This mechanism is consistent with reduced-form evidence such as Baker and Milligan (2008).

[5] Removing entry costs alone substantially increases women's regular-job employment, narrowing gender gaps in labor supply and raising fertility, even without any PL policy reforms.

[6] Adda et al. (2017) estimate a rich structural life-cycle model of female labor supply that incorporates maternity leave (but with exogenous male behavior) to quantify the career costs of children using German data. Their counterfactual analysis focuses on a policy that provides a lump-sum cash transfer at birth. Jakobsen et al. (2024) examine the complex linkages between fertility and labor supply using a rich structural model estimated for Denmark. Their analysis also considers several policy reforms, including the complete removal of maternity leave, using their model that abstracts from fathers' PL. They find that this reform reduces fertility while increasing female labor supply.

Kozlowski, 2020, Zhou, 2022, Kitao and Nakakuni, 2024, Guner et al., 2024).[7]

In terms of modeling choices, our framework also incorporates borrowing constraints and incomplete asset markets—a workhorse model framework in the literature—as young and relatively low-income households often face borrowing constraints, which may hinder fertility choices, particularly when prospective parents anticipate high monetary costs of having children.[8] Moreover, our model, in which both partners in a couple make their career choices endogenously, aligns with recent studies emphasizing the importance of modeling joint decision-making within couples (Bick and Fuchs-Schündeln, 2017, Borella et al., 2022, Erosa et al., 2022, Guner et al., 2023), despite the heavier computational burden it imposes, particularly in life-cycle frameworks.[9]

Along the path to gender gap convergence (Goldin, 2014), many developed countries have introduced family-friendly policies, including PL (Olivetti and Petrongolo, 2017). However, empirical evidence on the effects of such policies on gender gaps in labor markets and fertility remains mixed (Lalive and Zweimüller 2009, Dahl et al. 2016, Farré and González 2019, Kleven et al. 2024, Corekcioglu et al. 2024, Bronson and Sanin 2025). The literature examines various policy dimensions, including not only benefit generosity but also leave duration, with much of the evidence coming from European contexts.[10] Variation in findings may stem from differences in broader societal characteristics, such as labor market structures and gender norms. By capturing these underlying mechanisms, our theoretical framework provides a useful lens for understanding how PL policies shape fertility and labor supply outcomes.

This paper is organized as follows. Section 2 introduces a simple static model of PL. Section 3 documents key life-cycle patterns. Section 4 builds the quantitative life-cycle model. Section 5 discusses model calibration and evaluates the model's fit. Section 6 presents the main quantitative exercises. Finally, Section 7 concludes.

2 A Simple Model of PL, Gender Gaps, and Fertility

To illustrate a key obstacle to achieving both higher fertility and reduced gender labor supply gaps through PL policies under conventional mechanisms, we begin with a simple static model of household decision-making. The model captures the traditional

[7]For broader discussions, see the literature reviews in Doepke and Tertilt (2016), Greenwood et al. (2017) and Doepke et al. (2023).

[8]Adda et al. (2017) and Choi (2017) also highlight the importance of assets in fertility decisions.

[9]As such, our quantitative theoretical approach differs from Yamaguchi (2019) and Wang (2022), who estimate discrete choice models of female labor supply and PL take-up but abstract from wealth heterogeneity through savings and joint decision-making within couples.

[10]For a comprehensive review of the empirical findings, see Doepke et al. (2023) and Hart et al. (2024).

trade-off in women's time allocation between market work and child-rearing, as well as the role of more generous PL benefits in shaping these choices within this trade-off.

Setup of the Model We consider a household consisting of a female f and a male m partner who jointly maximize utility. Utility is derived from consumption c and the number of children n, while disutility arises from labor supply, denoted by h_f and h_m for the female and male partners, respectively.

Household income depends on wages, w_f and w_m, and each partner's respective labor supply. Having a child incurs costs, denoted by x, which increase with the female labor supply h_f, reflecting the assumption that mothers bear the majority of child-rearing responsibilities. Additionally, these costs rise with the female's wage, capturing the opportunity cost of outsourcing child-rearing activities, such as childcare services, which are assumed to be priced similarly to the mother's wage rate.

We assume that PL benefits are available only to female workers, providing a replacement rate $\theta \in [0, 1]$ of their wage per child for time spent away from work $(1 - h_f)$.[11] Normalizing total time endowment to 1, the household's budget constraint is:

$$c + xn \leq \sum_{g=f,m} w_g h_g + \theta w_f (1 - h_f) n, \tag{1}$$

where $x = \eta h_f w_f$ and η captures the degree of the education burden and childcare.

The household maximizes the following utility function:

$$\max_{c,x,n,h_f,h_m} \log c - \sum_{g=f,m} \chi_g \frac{h_g^{1+\sigma_h}}{1+\sigma_h} + \phi \log n, \tag{2}$$

subject to equation (1). Here, $\chi_g > 0$ represents the disutility weight on labor supply, and $\phi > 0$ captures the utility weight of having children. We consider parameter values that ensure interior solutions, such that $c, x, n > 0$ and $h_f, h_m \in (0, 1)$.

Optimality Conditions The optimal labor supply decisions imply that the gender labor supply gap (h_m/h_f) is given by:

$$\frac{h_m}{h_f} = \left(\frac{\chi_f}{\chi_m}\right)^{\frac{1}{\sigma_h}} \left(\frac{w_m}{w_f}\right)^{\frac{1}{\sigma_h}} \left[\frac{1}{1 - (\eta + \theta) n}\right]^{\frac{1}{\sigma_h}}. \tag{3}$$

[11] This assumption is made to focus on the theoretical result we aim to highlight in this section. In the full dynamic model from Section 4 onward, we relax this assumption and allow both partners to use PL for evaluating the policy effects quantitatively.

Equation (3) shows that the labor supply gap widens with a larger gender wage gap (w_m/w_f). It also shows that a higher childcare burden (η) increases the gap for a given fertility level (n), as mothers bear a disproportionate share of childcare responsibilities.

The gender wage gap and childcare burden also influence fertility choices. The household's optimal fertility decision is characterized by:

$$n = \left(\frac{1}{1+1/\phi}\right)\left(1+\frac{w_m}{w_f}\frac{h_m}{h_f}\right)\left[\frac{1}{\eta-\theta\left(1/h_f-1\right)}\right]. \tag{4}$$

First, equation (4) highlights that the gender wage gap (w_m/w_f) affects fertility through changes in the opportunity cost of having a child: a narrower wage gap reduces the incentive to have more children. Second, the childcare burden (η) negatively impacts fertility, as higher costs make having children more expensive.

The Trade-Off in PL Policies: Fertility and Gender Labor Supply Gaps We now present the main result of this section, highlighting the trade-off in PL policies that aim to achieve two goals: boosting fertility and reducing the gender labor supply gap. Differentiating equations (3) and (4) with respect to θ, we find that the labor supply gap *worsens* when PL becomes more generous if and only if:

$$\underbrace{n}_{\substack{\text{Direct}\\\text{channel}}} + \underbrace{(\eta+\theta)\frac{dn}{d\theta}}_{\substack{\text{Indirect channel}\\\text{via fertility}}} > 0. \tag{5}$$

The first term captures the direct effect on the labor supply gap: as θ increases, women's opportunity cost of working rises in proportion to the number of children, reducing their labor supply. The second term reflects the indirect effect of more generous PL policies on labor supply through changes in fertility choices. When fertility increases, the labor supply gap worsens in proportion to the sum of childcare burden and the existing level of PL generosity.

Note that if PL policies boost fertility ($dn/d\theta > 0$), the overall effect on female labor supply relative to male labor supply is negative.[12] This implies that, within this static framework, more generous PL benefits cannot simultaneously increase fertility and reduce the gender labor supply gap. This result highlights the trade-offs in using PL generosity: while generous PL benefits can encourage childbirth, they may also widen the gender labor supply gap by reducing women's labor supply, particularly with strong

[12] It may well be that $dn/d\theta \leq 0$, but we do not consider this case because one of its two policy objectives—higher fertility—is already unattainable.

childcare burdens.

However, the simple model in this section focuses on the women's time allocation trade-off in a static setting, abstracting from key dynamic factors such as the long-term career impacts of taking PL in an environment with segmented jobs that differ in wage growth and entry barriers to career-oriented ones. In the next section, we present stylized facts on Korea's segmented labor market, followed by a quantitative model that incorporates these dynamic aspects for a more rigorous analysis of PL policies.

3 Gender Gaps in Korea's Segmented Labor Market

This section presents descriptive facts on gender gaps across various dimensions in Korea's labor market, providing the foundation for the quantitative model introduced in the following sections. Throughout the paper, our analysis relies on data from the Korean Labor and Income Panel Study (KLIPS), a comprehensive longitudinal dataset capturing labor market dynamics in Korea. We restrict the baseline sample to households where the female member was born between 1970 and 1975 (*Cohort 2*), observed in the 1998–2021 waves.[13] Notably, this cohort experienced PL policies that were limited in generosity and had very low take-up rates[14]. For robustness, we also examine adjacent cohorts, including those born between 1965–1970 (*Cohort 1*) and 1975–1980 (*Cohort 3*). To adjust for inflation, all nominal variables are converted to 2012 Korean Won (KRW) using the CPI index. Finally, to align with the two-year model periods in the following sections, we aggregate annual data into two-year intervals. More details are available in Appendix B.

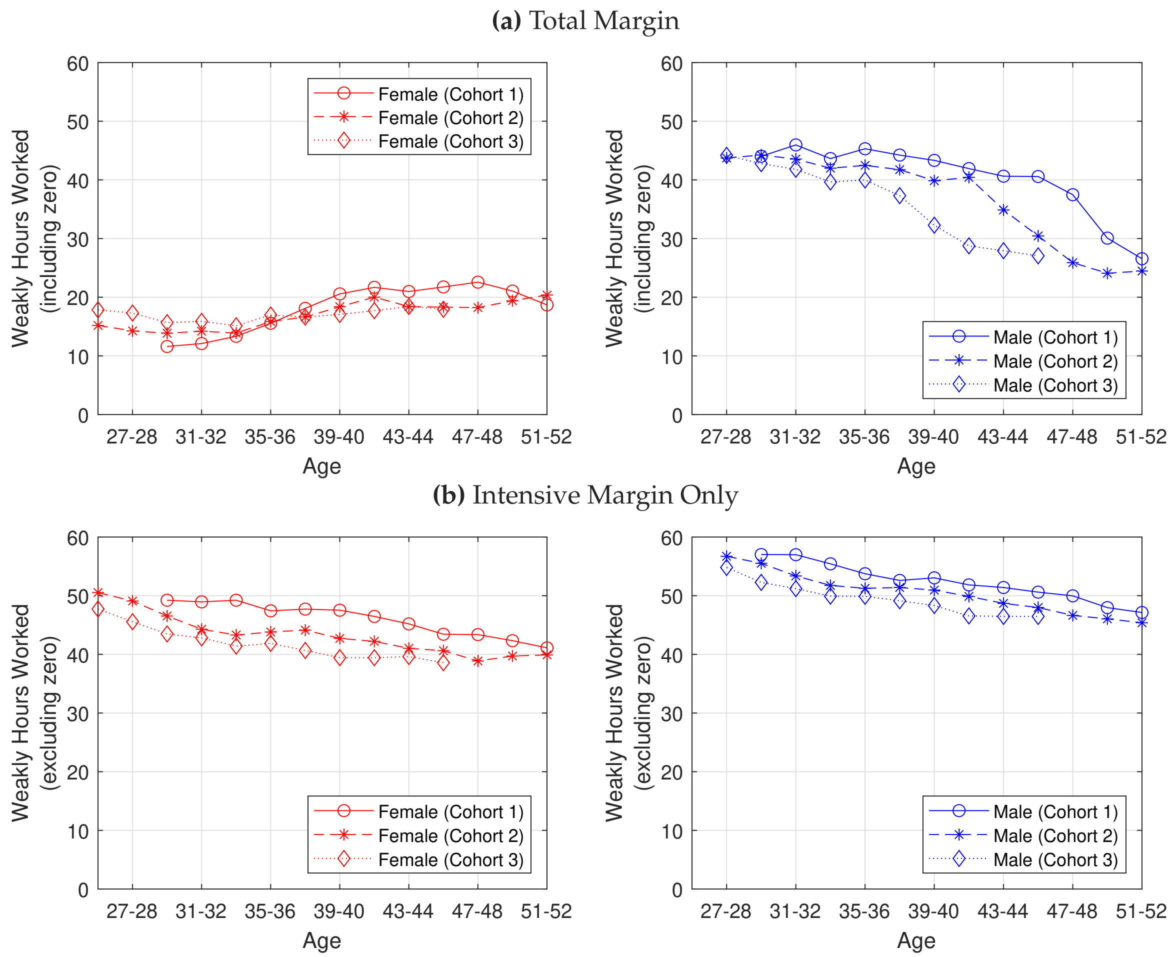
Labor Supply Gaps As highlighted in the introduction, gender gaps in labor supply remain significant in Korea. We now examine these gaps in greater detail. To construct a comprehensive measure of labor supply that captures both the intensive and extensive margins, we first compute the average total weekly hours worked over two-year periods including zero observations.

Panel (a) of Figure 2 depicts the average hours worked by females and males by age, starting at ages 25–26. Notably, average total weekly hours among young men are high, exceeding 40, even when nonworking individuals are included as zeros. Male hours

[13]Our sample focuses specifically on married couples, who are largely representative of these cohorts. Cohabitation is uncommon in Korea due to Confucianism-driven social norms, making non-marital childbearing rare as well (Myong et al., 2021).

[14]The low PL usage during the childbearing years of our baseline cohort is evident in the very low PL use share in 2010, the first year for which aggregate PL statistics are available (see Figure A6).

Figure 2: Labor Supply Dynamics by Gender Over the Life Cycle



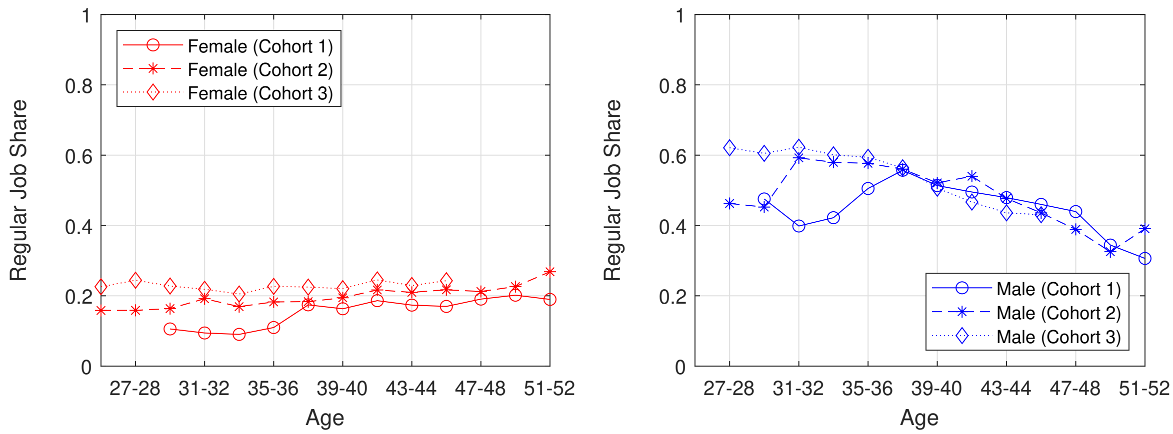
Notes: The total and intensive margins of labor supply are measured by average weekly hours worked over two years, including and excluding zeros, respectively. Cohort 1: 1965–70, Cohort 2: 1970–75, Cohort 3: 1975–80.

worked gradually decline after their 40s, mirroring a common pattern in the life-cycle profile of labor supply observed in other countries. In contrast, females' average total hours worked are considerably lower, around 15 weekly hours at ages 25–26. Somewhat surprisingly, their labor supply then gradually increases with age. By the time their children reach school age, female labor supply begins to rise, possibly due to childcare responsibilities easing.

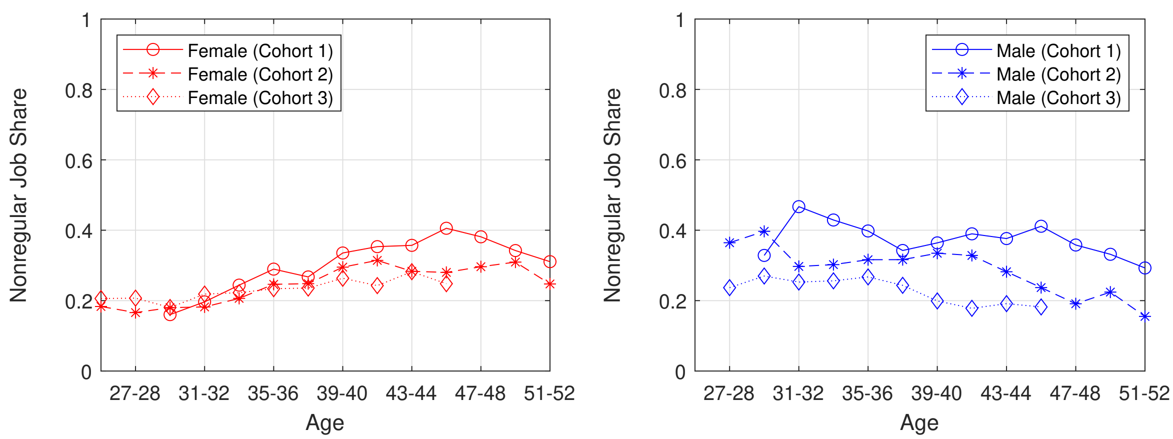
To assess how much of the variation in total hours worked is driven by the intensive versus extensive margins, Panel (b) of Figure 2 plots hours worked conditional on employment (i.e., excluding zero observations), thereby capturing the intensive margin of labor supply. Strikingly, although a gender gap remains, it is much smaller among employed workers, and its decline with age is nearly parallel for both genders. This

Figure 3: Employment Rates by Job Type and Gender Over the Life Cycle

(a) Regular Job Employment Rate



(b) Nonregular Job Employment Rate



Notes: The regular and nonregular job employment rates are calculated as the ratio of individuals with regular jobs and nonregular jobs, respectively, to the total observations, averaged over a two-year period. Cohort 1: 1965–70, Cohort 2: 1970–75, Cohort 3: 1975–80.

pattern suggests that the gender gap in total hours worked are driven primarily by the extensive margin, which we now examine in more detail below.

Segmented Labor Markets When it comes to employment, Korea's labor market is distinctly segmented, with regular jobs and nonregular jobs, the latter comprising temporary (or irregular) employment and subsistence self-employment (Schauer, 2018).[15] In general, regular workers benefit from stable employment and higher wages through career progression but encounter inflexibilities, such as the long hours typically required in these jobs. By contrast, nonregular workers experience greater job insecurity and

[15]A similar dual labor market structure has been studied in a quantitative framework, e.g., for Japan (Yamaguchi, 2019) and Spain (Guner et al., 2024).

Table 1: Labor Supply Around Childbirth

	Female				Male			
Birth Event (2-year period)	-1	0	$+1$	$+2$	-1	0	$+1$	$+2$
Total Margin (including zero)	0	-34.0	-31.0	-25.3	0	-2.2	-0.7	0.4
Intensive Margin (excluding zero)	0	-2.6	-3.8	-12.5	0	-0.7	0.1	-0.8
Employment Rate	0	-31.0	-25.7	-8.0	0	-1.5	1.8	0.9
Regular Job Employment Rate	0	-30.1	-33.4	-27.5	0	-4.3	-1.7	6.2

Notes: The baseline average weekly working hours in the two-year period before childbirth (period -1) are 15.2 (including zero) and 45.9 (excluding zero) for females and 45.1 (including zero) and 53.2 (excluding zero) for males. The baseline employment rates in the two-year period before childbirth (period -1) are 37.1% (all jobs) and 21.5% (regular) for females and 90.0% (all jobs) and 58.6% (regular) for males. Cohort 2: 1970–75.

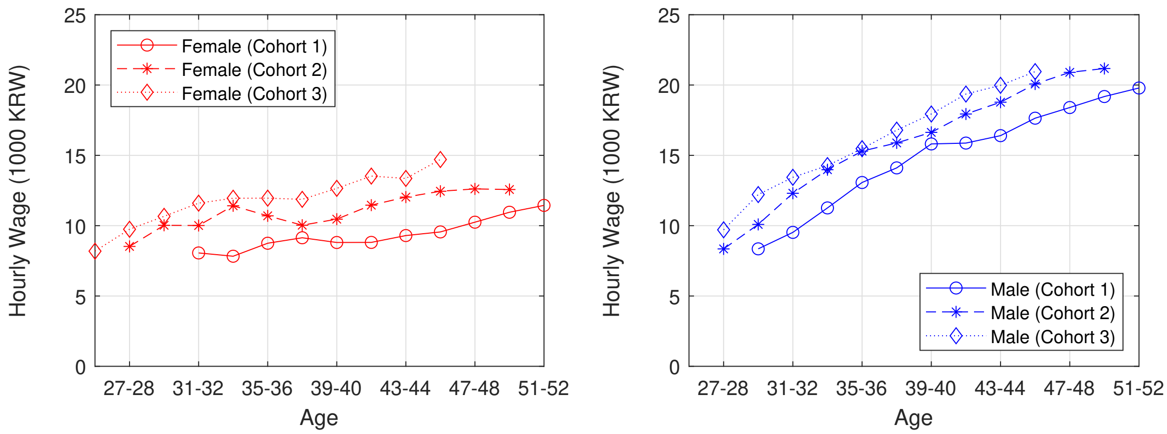
lower wages, despite having more flexible working hours.

Given the sizable wage and stability premium for regular jobs, it is important to examine gender gaps in the share of workers holding these positions. Figure 3 shows the share of female and male workers in regular jobs (Panel (a)) and nonregular jobs (Panel (b)) over the life cycle. Clearly, male workers are significantly more likely to hold regular jobs at all ages. Nonregular employment rates among females increase after their 40s, often exceeding those of males. This shift coincides with the rise in total hours worked among females, as shown in Figure 2. The fact that many of these women enter nonregular jobs with lower wages and fewer career opportunities may reflect the challenges of re-entering regular, career-oriented jobs after career breaks.

Career Interruptions Around Childbirth Childbirth is well known to be associated with asymmetric declines in mothers' labor market outcomes relative to fathers in many developed countries. We now examine how these patterns appear in our data and how they relate to the life-cycle patterns documented above. Table 1 presents the labor supply and employment rate changes around a birth event (period 0).[16] It shows a dramatic drop in female labor supply: mothers' total weekly hours (including zeros) fall by 34% in the birth period and remain 25% below the pre-birth level four years later (period $+2$). The next two rows show that this is largely due to the extensive margin. The final row reveals the crucial role of labor market segmentation in this process. At the time of birth, regular job employment for mothers drops sharply by 30%. This decline is highly persistent: four years later, the regular-job employment rate remains

[16] We pool all birth events to ensure adequate sample size. The main patterns remain robust when restricting to first births only.

Figure 4: Wage Dynamics by Gender and Job Type Over the Life Cycle



Notes: Wage is calculated as the average hourly wage in 2012 Korean Won over a two-year period. Cohort 1: 1965–70, Cohort 2: 1970–75, Cohort 3: 1975–80.

28% below the pre-birth level, indicating a significant and lasting career interruption.

These negative effects around childbirth are borne almost entirely by mothers. Fathers' labor supply and employment patterns remain remarkably stable across all measures. Their working hours and employment exhibit only negligible changes. Regular employment for fathers dips slightly at birth (–4%) but rebounds quickly, rising to 6% above the pre-birth level by period +2. Detachment from regular jobs around childbirth is a distinctly female pattern. Combined with the difficulty of transitioning into regular jobs later in life, this pattern suggests a channel through which long-term career interruptions may arise—potentially contributing to the persistent gender wage gaps examined next.

Wage Gaps Korea is often cited as having one of the largest gender wage gaps among developed countries. To illustrate how these gaps evolve over the life cycle, we compute the average hourly wage by gender and age. Figure 3 shows that the average male wage increases steadily with age, reflecting career progression effects. In contrast, female wage growth is slower in early career stages, likely due to promotion barriers associated with childbirth. Beyond their mid-30s, women's wages stagnate, suggesting limited career advancement opportunities. By their 50s, male workers earn nearly twice as much as female workers on an hourly basis, highlighting a significant widening of the gender wage gap with age.[17]

Against the backdrop of the above observations, there appears to be some potential for PL policies to influence gender disparities in labor markets and fertility dynamics beyond the static trade-off in women's time allocation described in Section 2. For example, job protection under PL can ease the burden on female workers seeking to balance work and family by allowing them to remain in regular jobs. However, the mechanisms driving these effects are complex, involving dynamic factors such as market entry frictions, future returns to current labor supply (e.g., promotions), and intertemporal substitutions. Additionally, both partners within a couple may strategically adjust their labor supply in response to PL policy changes, making a purely reduced-form analysis challenging.

Therefore, in the next section, we develop a quantitative life-cycle model in which labor supply, careers, and wages of each partner, as well as their joint fertility choices, are endogenously determined. This model allows us to assess how PL policies shape household decision-making in both the short term and over the life cycle while systematically examining the mechanisms driving these effects.

4 Quantitative Life-Cycle Model

4.1 General Model Environments

A household, or married couple, consists of two adults: a female and a male, indexed by $g \in \{f, m\}$. Each period corresponds to two years (see Appendix Table A3 for an overview of the age structure). Households enter the model at $j = 1$, when the female member is 25–26 years old. At this stage, they are ex-ante heterogeneous in education levels, denoted by $\mathbf{e} \equiv (e_f, e_m)$, and in the number of children n born previously. Households make joint decisions regarding work, choosing job types $\mathbf{s} \equiv (s_f, s_m)$, where each job can be either regular (permanent, P) or nonregular (temporary, T). Job type determines the available choice set for working hours, as detailed below. Given labor supply choices $\mathbf{h} \equiv (h_f, h_m)$, households then make standard consumption-savings decisions.

[17] The gender wage gap is also pronounced in career-oriented jobs. Panels (a) and (b) of Appendix Figure A4 present average wages for regular and nonregular jobs by gender and age. While gender wage gaps are relatively small among younger workers, they widen significantly with age, particularly in regular jobs where career development is crucial. In nonregular jobs, the gender wage gap remains smaller but persists. These differences in wage trajectories across job types largely explain the overall widening gap seen in Figure 3.

At the beginning of each fertile period ($j = 1, 2, \ldots, 10$), households decide whether to have an additional child, subject to fecundity uncertainty. During infertile periods ($j = 11, \ldots, 14$), fertility is no longer a choice variable. At the end of $j = 10, \ldots, 14$, existing children leave the household stochastically. During the old periods ($j \geq 15$), households have no children and no longer make endogenous labor supply choices but receive exogenous old-age income.[18] Households live until $j = 28$ (age 79–80). In all periods, they can save in assets but face standard borrowing constraints within an incomplete asset market framework.

4.2 Children and Gender Norm

Fertility choices primarily depend on the benefits and costs of having children. We assume that children bring utility (Becker and Tomes, 1976) yet also incur costs that vary by age. A key component of our model is about the cost of having children. Due to the computational burden of tracking each child's age, we classify children into two stages: the infant period (the first two years) and the noninfant periods.

During the infant period, parents must satisfy a childcare requirement constraint:

$$\eta \leq G(t_f, t_g, x_b) \equiv \left[\nu_t \left(t_f^{\varphi} + t_m^{\varphi}\right)^{\frac{\rho}{\varphi}} + \nu_x \left(x_b\right)^{\rho}\right]^{\frac{1}{\rho}}, \tag{6}$$

where η represents the childcare burden. Childcare needs are met through the nested constant-elasticity-of-substitution (CES) technology G, which aggregates time and monetary inputs. First, parental time contributions (t_f and t_m) are combined with a constant elasticity of substitution determined by $\varphi < 1$ (Knowles, 2013). The aggregate time input is then combined with market goods (x_b, i.e., monetary spending on childcare) under a CES structure with the elasticity determined by $\rho < 1$. The share parameters are given by ν_t and ν_x, respectively.

A notable feature of Korean society that we incorporate into our model is the gender norm regarding childcare responsibilities (Hwang et al., 2019). First, we assume that parental time input is dictated by social norms as a function of nonworking hours:

$$t_g = (\bar{h} - h_g)\lambda_g, \tag{7}$$

where λ_g captures the degree of the gender norm in childcare, $\bar{h}$ represents total time

[18]This assumption is made for practical reasons. First, the number of individuals in our baseline cohort sample declines sharply after their early 50s. Moreover, according to Statistics Korea, the average retirement age from the main job has been around 50, though many older individuals continue working in non-career-oriented jobs.

endowment, and h_g denotes hours worked by parent g. If $\lambda_f > \lambda_m$, this reflects a gender norm that places a greater childcare burden on mothers, aligning with societal expectations of unequal gender roles discussed in the literature.[19]

Children remain costly beyond the infant stage. In Korea, students attend various after-school private education programs, known as *Hagwon*s, which are highly expensive and have an exceptionally high participation rate (Kim et al., 2024). At this stage, Korean parents primarily focus on enrolling their children in more and better *Hagwon*s. Given this, we assume that the perceived quality of a noninfant child is an increasing function of education expenditure per noninfant child x_q: $q = x_q^{\alpha}$. Here, α governs parents' demand for child quality.

4.3 Careers: Jobs, Promotion, and Labor Supply

As illustrated in Section 3, the Korean labor market features a segmented dual structure, in which career-oriented jobs are difficult to re-enter at older ages following a career break. Our model is designed to capture these dynamics in career choice, promotion, and labor supply.

Specifically, in each period, couples decide whether to participate in the labor market and, if so, which job type to pursue (s_g)—regular (P) or nonregular (T). At the end of each period, regular job workers face exogenous separation with a constant probability ϱ_j. We denote a worker's job status at the end of the period as $\tilde{s}'_g$.

In our model, regular jobs are attractive for several reasons. Any worker entering the labor market draws a job quality shock, $z_g \sim \log N(0, \sigma^2 z)$. To capture the job stability aspect of regular jobs, we assume that workers who remain in regular positions ($\tilde{s}'_g = s_g = P$) retain their job quality from the previous period. In contrast, nonregular workers face uncertainty, as they receive a new job quality shock each period. Second, beyond the job stability channel, we assume that only regular workers have opportunities for career development. Assuming a discrete career status ($\chi_g \in 1, 2, 3$), all new regular workers, like nonregular workers, start at the entry level, i.e., $\chi_g = 1$ if $s_g = P$ and $\tilde{s}_g = T$. They then face a promotion probability that increases with their current labor supply. Individuals who get promoted ($\chi'_g = \chi_g + 1$) earn higher wages in the subsequent period.[20] To account for residual factors not captured by these channels in rationalizing the higher wages of regular workers observed in the data, we introduce an exogenous

[19] These gender norms, influenced in part by Confucianism (Hwang et al., 2019, Myong et al., 2021), are also prevalent in some European countries.

[20] Conversely, continuing regular workers who are not at the entry level ($\tilde{s}_g = \tilde{s}'_g = P$ and $\chi_g \geq 2$) face a probability of demotion ($\chi'_g = \chi_g - 1$), which decreases with their current labor supply.

wage premium of regular jobs relative to nonregular jobs, $\omega_{P,g}$. Lastly, the option of PL is available only to regular job workers, as we elaborate on later.[21]

Despite these advantages, regular jobs are less flexible, requiring a minimum number of working hours, as in Jang and Yum (2022), denoted as $\underline{h}_P$, leading to a restricted choice set for hours worked: $\mathbb{H}_P = \{\underline{h}_P, \ldots, \bar{h}\}$. Meanwhile, nonregular jobs ($s_g = T$) impose no minimum working hour requirements, allowing flexibility with the choice set $h_g \in \mathbb{H}_T = \{0, \ldots, \bar{h}\}$. Additional inflexibilities for mothers beyond this minimum-hours requirement may arise. Infant children can impose extra burdens on mothers' labor supply that interact with the childcare requirement constraint (equation 6), and older children can likewise limit mothers' ability to work in jobs that lack flexibility. We capture these effects through two parameters, ι_b and ι_n, which apply to mothers with an infant and to mothers with any children in the household, respectively.

Moreover, we assume that individuals who were not in a regular job in the previous period must incur entry costs to access regular jobs. Specifically, in each period, those without a regular job history in the previous period draw entry costs ξ from an age-dependent distribution $F_{e,g,j}(\xi; n)$. Korea's corporate culture often favors hiring fresh graduates for new regular positions, partly due to the social importance of age, which can create tension when older employees report to younger supervisors. Given this, we expect that average entry costs increase with age, a pattern we later confirm in the data. The distribution also depends on education, to capture the advantages associated with being college-educated, and on gender and the number of children, to reflect the additional difficulties mothers may face in entering regular jobs.

4.4 Parental Leave

In our model, PL take-up is one of the key decisions. We now discuss how the advantages and costs of using PL are modeled. First, longer leave durations reduce hours worked and increase childcare time. Additionally, in our dynamic life-cycle framework, a key advantage of taking PL is job protection. Having an infant imposes time costs, pressuring parents to work less. This is particularly costly from a career perspective when regular jobs require a minimum number of working hours. We assume that taking PL helps workers retain their regular jobs, as it is legally counted as a working period.

[21] In practice, temporary job workers are legally eligible for PL if their prior work period meets the minimum requirement (six months). However, PL take-up is very rare among temporary workers. Moreover, PL take-up for self-employed individuals without employees is conceptually ill-defined. Therefore, we focus on PL take-up among regular job workers.

That is, given the PL length (l_g) of regular workers, the labor supply set is given by:

$$\mathbb{H}_P = \{h_g \geq 0 \mid \underline{h}_P \leq l_g + h_g \leq \bar{h}\}, \tag{8}$$

where PL effectively lowers the minimum required hours. This allows parents to work fewer hours to meet childcare needs without exiting regular jobs and avoid costly re-entry later.

In addition, an income effect arises from the generosity of PL monetary benefits. This effect is captured by $\mathcal{B}(l_f, l_m, w_f, w_m)$, which depends on PL lengths and parental wages. This function is flexible enough to capture flat benefits, wage-dependent benefits, and joint-use incentives, as explained in Section 5.2.

PL comes with costs. First, although the monetary benefit is often considered an advantage, many families choose not to take PL due to financial hardship, as the benefit can be far below typical earnings. Moreover, taking PL can have long-term career implications, as promotion and demotion probabilities depend on actual hours worked, excluding PL periods. Lastly, economic costs alone—whether static or dynamic—may not fully explain the low take-up rates observed in the data. As discussed next, we introduce stigma-related nonpecuniary costs associated with taking PL.

4.5 Preferences

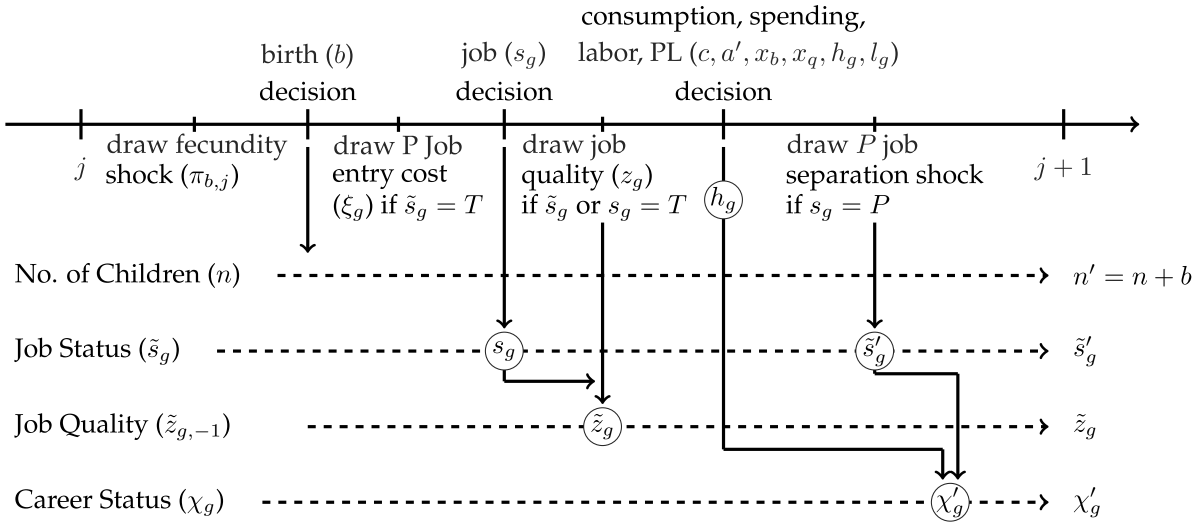
Households derive utility $u(\cdot)$ from total household consumption c divided by an equivalence scale $\Lambda(n)$ that is a function of the number of noninfant children n. Additionally, utility depends on the number n and quality q of noninfant children, captured by $\phi(n, q)$. Labor supply h_g incurs disutility, which also depends on the number of noninfant children to capture child-related participation costs, as discussed above. The disutility of labor supply for a couple is captured by $v(\cdot)$, which is assumed to depend on labor supply, education, careers, children, and age. In addition to these standard utility components, we introduce stigma disutility associated with PL take-up l_g, captured by the function $d(l_f, l_m)$. This reflects the well-documented reluctance of employees, particularly men, to use PL (Kim and Lundqvist, 2023).

4.6 Household Optimization Problems

We first describe the household optimization problem during fertile periods ($j \leq 10$). Figure 5 outlines the timeline of decisions in a fertile period.

At the beginning of each period j, households learn their fecundity realization $\pi_{b,j}$. If

Figure 5: Timeline within a Fertile Period



they are able to have a child, they decide whether to have a newborn. At this point, the state variables include household assets (a), the current number of noninfant children (n), previous job and career status ($\tilde{s}_g, \chi_g$), last-period job quality ($z_{g,-1}$), and education level ($e_g \in \{1, 2\}$, where 2 denotes college and 1 non-college). The value function at this stage is then given by:

$$W(a, n, \tilde{\mathbf{s}}, \boldsymbol{\chi}, \tilde{\mathbf{z}}_{-1}, \mathbf{e}, j) = \pi_{b,j} \max \Big\{ \underbrace{\bar{N}(a, n, \tilde{\mathbf{s}}, \boldsymbol{\chi}, \tilde{\mathbf{z}}_{-1}, \mathbf{e}, j)}_{\text{value of having a new-born}}, \underbrace{\bar{V}(a, n, \tilde{\mathbf{s}}, \boldsymbol{\chi}, \tilde{\mathbf{z}}_{-1}, \mathbf{e}, j)}_{\text{value of no additional child}} \Big\} + (1 - \pi_{b,j}) \bar{V}(a, n, \tilde{\mathbf{s}}, \boldsymbol{\chi}, \tilde{\mathbf{z}}_{-1}, \mathbf{e}, j), \tag{9}$$

where the value of having a newborn and having no additional child are denoted by $\bar{N}(a, n, \tilde{\mathbf{s}}, \boldsymbol{\chi}, \tilde{\mathbf{z}}_{-1}, \mathbf{e}, j)$ and $\bar{V}(a, n, \tilde{\mathbf{s}}, \boldsymbol{\chi}, \tilde{\mathbf{z}}_{-1}, \mathbf{e}, j)$, respectively. Here, a bold variable represents the vector of a couple's variable: $\mathbf{x} = (x_f, x_m)$.

Depending on their birth choice, they then choose between regular and nonregular jobs. If an individual did not have a regular job in the previous period ($\tilde{s}_g = T$) but wants to enter a regular job ($s_g = P$), they must pay an entry cost ξ_g drawn from the distribution $F_{e,g,j}(\xi; n)$. The value of having another child ($b = 1$) is thus given by

$$\bar{N}(a, n, \tilde{\mathbf{s}}, \boldsymbol{\chi}, \tilde{\mathbf{z}}_{-1}, \mathbf{e}, j) = \mathbb{E}_{\boldsymbol{\xi}} \max_{\mathbf{s}} \Big\{ \bar{N}_{\mathbf{s}}(a, n, \tilde{\mathbf{s}}, \boldsymbol{\chi}, \tilde{\mathbf{z}}_{-1}, \mathbf{e}, j) - \sum_g \xi_g \mathcal{I}_{\tilde{s}_g = T, s_g = P} \Big\}. \tag{10}$$

New regular workers and temporary workers must draw a new job quality shock. The value of current job choices ($\mathbf{s} = (s_f, s_m)$) *before* observing the shock z_g is given by:

$$\bar{N}_{\mathbf{s}}(a, n, \tilde{\mathbf{s}}, \boldsymbol{\chi}, \tilde{\mathbf{z}}_{-1}, \mathbf{e}, j) = \mathbb{E}_{\mathbf{z}} N_{\mathbf{s}}(a, n, \boldsymbol{\chi}, \tilde{\mathbf{z}}, \mathbf{e}, j), \tag{11}$$

where $\tilde{z}_g = \tilde{z}_{g,-1} \times \mathcal{I}_{\tilde{s}_g = s_g = P} + z_g \times (1 - \mathcal{I}_{\tilde{s}_g = s_g = P})$ shows that a worker keeps their job quality $\tilde{z}_{g,-1}$ only when they work a regular job consecutively.

For a given job choice (s) *after* the realization of the job quality shock, the value is:

$$N_{\mathbf{s}}(a, n, \boldsymbol{\chi}, \tilde{\mathbf{z}}, \mathbf{e}, j) = \max_{\substack{c, a', x_b, x_q \geq 0 \\ h_g \in \mathbb{H}_{s_g}, l_g \in \mathbb{L}_g}} \left\{ \begin{array}{l} u(c/\Lambda(n)) + \phi(n, x_q^{\alpha}) - v(\mathbf{h}, \mathbf{e}, s_f, n, b, j) - d(\mathbf{l}) \\ + \beta \mathbb{E}_{\boldsymbol{\chi}'|(\boldsymbol{\chi}, \mathbf{s}, \mathbf{l}), \tilde{\mathbf{s}}} W(a', n', \tilde{\mathbf{s}}', \boldsymbol{\chi}', \tilde{\mathbf{z}}, \mathbf{e}, j+1) \end{array} \right\} \tag{12}$$

subject to

$$c + x_q n + x_b + a' = \sum_g w_g h_g + (1+r)a + \mathcal{B}(\mathbf{l}, \mathbf{w}) - \mathcal{T}(\mathbf{h}, a, \mathbf{w}) \tag{13}$$

$$w_g = \omega_{e,j} \gamma_{\chi_g} \tilde{z}_g (1 + \tilde{\omega}_{P,g} \mathcal{I}_{s_g = P})(1 - \mathcal{I}_{g=f} \varsigma), \ g = f, m \tag{14}$$

$$n' = n + 1 \tag{15}$$

$$\eta \leq G(\mathbf{t}, x_b), \tag{16}$$

where r denotes the return on assets, and $\mathcal{T}(\mathbf{h}, a, \mathbf{w})$ represents asset and labor income taxes net of transfers.[22] Individual wages w_g depend on several factors. First, $\omega_{e,j}$ accounts for education premiums and age gradients in wages. Second, career status influences wages through γ_{χ_g}, where promotions increase wages. Job quality $\tilde{z}_g$ also affects individual wages. Wage premiums associated with regular jobs, to the extent not captured by career premiums, are absorbed by $\tilde{\omega}_{P,g}$. Finally, we introduce a wage shifter for women ($\varsigma \geq 0$) to account for residual factors not explicitly modeled that lower female wages relative to men, allowing the model to match the observed gender wage gap. At the end of each period, regular workers face an exogenous separation shock. If they experience this shock while holding a regular job ($s_g = P$), their status in the next period changes to $\tilde{s}_g = T$ and $\chi'_g = 1$.

Since this represents the value conditional on having an additional child, the number of children in the next period increases, and the childcare requirement constraint must be met, as discussed in Section 4.2. Moreover, the budget constraint accounts for monetary spending on noninfant children ($x_q n$) and the infant child (x_b) as expenses,

[22] In the final fertile period ($j = 10$), the expected future value is instead based on the first infertile-period value function and accounts for the stochastic departure of children from the household.

while PL monetary benefits $\mathcal{B}(\mathbf{l}, \mathbf{w})$ appear as income, as discussed in Section 4.4.

The value of not having an additional child $\bar{V}$ is similar to the value of having a newborn $\bar{N}$, as described above, but with $b = 0$, and x_b, l_f, and l_m no longer being choice variables. Moreover, the budget constraint excludes PL benefits, and the infant childcare constraint is not present.

The value of a household in infertile periods ($j = 11, \ldots, 14$) is similar to the value of not having a newborn in fertile periods, except that existing children leave households stochastically, as in Sommer (2016).[23] In the old periods ($j = 15, \ldots, 28$), there are no children ($n = 0$) in the household. Instead of modeling endogenous labor supply and career choices, we assume that agents receive exogenous old-age income such as pensions and earnings. The household's value function in this stage, R, follows a conventional life-cycle problem with consumption-savings decisions. See Appendix C for details on the recursive problems in the infertile and old periods.

5 Parameterization and Calibration

5.1 Calibration Strategy

For the quantitative analysis, we calibrate the model to our baseline cohort of Korean households, where females were born between 1970 and 1975. The calibration follows a two-step process, which is mostly standard, with a necessary extension in the second step. First, a set of parameter values is either set or estimated externally without simulating the model. The second step involves calibrating the remaining 46 parameters. Given that male PL use is nearly zero in the calibration target period, it is not feasible to calibrate the parameter governing male PL stigma costs. Therefore, we first calibrate 45 parameters (excluding μ_d) to match 93 target moments, while temporarily setting μ_d to a value that delivers zero male PL use in the baseline model. To calibrate μ_d, we then use all the calibrated parameters to simulate a recent PL policy regime and select its value that matches the observed male PL use share relative to females, as described in detail below.

[23] That is, although we still capture the degree of burden caused by the number of noninfant children in the household, we do not distinguish their quality or age. This assumption facilitates computational tractability, allowing us to incorporate details related to PL and career dynamics instead.

5.2 Model Parameters

The moment-matching technique we adopt relies on the informativeness of target moments for certain parameters, although the relationship is not one-to-one. We now explain these links between parameters and target moments in the second step, along with the description of externally calibrated parameters in the first step.

Children We set the maximum number of children to three. This choice is based on the observation that households with more than three children are very rare in our baseline sample. The utility from the quantity and quality of children is defined as

$$\phi(n, q) = \tilde{\phi}_n^{e_f, e_m} q = \tilde{\phi}_n^{e_f, e_m} x_q^{\alpha}, \tag{17}$$

where the twelve parameters $\{\tilde{\phi}_n^{e_f, e_m}\}_{n=1}^{3}$, with $e_f, e_m \in \{1, 2\}$, are internally calibrated to match the distribution of completed fertility by corresponding education groups in the data, while α is calibrated to match the observed average private education spending per child relative to income, as reported in Table 2.[24]

We now turn to the parameters related to the costs of children. First, we set $\rho = 0.25$ in equation (6), according to Hwang et al. (2018), who estimate that parental time and market childcare are substitutable in Korea, though less so than in the United States. (e.g., Bar et al., 2018). The elasticity of substitution between mother's and father's time is governed by φ. We set $\varphi = 0.4$, implying an elasticity of substitution of 2.5, consistent with Knowles (2013) and Myong et al. (2021), who find that mother's and father's time are highly, but not perfectly, substitutable. We normalize the share parameter $\nu_t = 1$ and calibrate ν_x internally to match the average childcare spending relative to income. The degree of infant childcare burden is set using $\bar{\eta} = G(0, \bar{h}/2, \bar{h}/2)$, ensuring that childcare costs are zero ($x_b = 0$) when each parent equally contributes their time allocations to newborn care. Finally, $\lambda_f = 0.50$ and $\lambda_m = 0.20$ are externally calibrated to the average ratio of parental time with young children to nonworking time, which is relatively stable across education groups, as reported in Appendix Table A2.

The fecundity probability for $j = 1, 2, \ldots, 10$ decreases as female age increases. To capture this age-dependent fecundity, we introduce the following functional form:

$$\pi_{b,j} = \tilde{\pi}_0 \big[1 - \exp(-\tilde{\pi}_1(11 - j))\big]. \tag{18}$$

[24] In the data, average private education spending per child relative to income is relatively stable across education groups.

We set $\tilde{\pi}_0 = 0.890$ and $\tilde{\pi}_1 = 0.246$ externally to best fit the medical literature estimates of fecundity by age (Leridon, 2004). This functional form with the parameter values generates declining fertility probabilities, as shown in Appendix Figure A5.

During the infertile periods ($j = 11, \ldots, 14$), children leave the household stochastically. The resulting transition in the number of children follows a binomial distribution: $n' \sim B(n, p_n)$. We set $p_n = 0.955$ externally to match the ratio of the average number of children in the household at $j = 14$ to that at $j = 11$ in the data (0.865).

Parental Leave In practice, PL policy design involves various dimensions and details, as noted by Doepke et al. (2023). This is especially true when PL benefits depend not only on an individual's choice but also on the spouse's choice and the duration of leave. Given this complexity, we focus on the major aspects of PL policies, which are captured by three key variables in the PL monetary benefit function $\mathcal{B}(\mathbf{l}, \mathbf{w})$: the wage replacement rate, the maximum PL duration, and the benefit bounds (cap and minimum). Note that in our model, PL encompasses both maternity leave and non-maternity parental leave, as implemented in practice.

Some detailed explanations for each dimension of the benefit function are in order. First, the wage replacement rate, $\theta(\mathbf{l})$, is generally modeled to depend on the PL length of each partner (i.e., $\mathbf{l} \equiv (l_f, l_m)$). This allows us to capture the fact that mothers receive a generous 100% replacement rate for their three-month maternity leave (i.e., $\theta(1, \cdot) = 1$), whereas non-maternity PL follows different replacement rules (i.e., $\theta(l_f, \cdot) < 1$ for $l_f \geq 2$).[25] Additionally, incorporating PL length for both partners enables us to account for different replacement rates introduced in recent reforms aimed at incentivizing joint PL use by allowing one partner's benefit to depend on the other's PL use.[26]

Next, the maximum PL length has remained one year per parent and is non-transferable across spouses for several decades, with recent reforms focusing on other aspects, as discussed in Section 6.1. Given this, we fix it at one year for men ($\bar{l}_m = 4$) and five quarters for women, which includes an additional quarter of maternity leave ($\bar{l}_f = 5$). Given these policy parameters, we allow eligible individuals to choose their PL length: if $s_g = P$ and $b = 1$, then $l_g \in \mathbb{L}_g = \{0, 1, \ldots, \bar{l}_g\}$; otherwise, $\mathbb{L}_g = \{0\}$.

Finally, we introduce a minimum benefit ($\underline{\Theta}$) and a cap ($\bar{\Theta}_f$ and $\bar{\Theta}$). The cap has been the primary focus of recent reforms. As such, we allow the cap to primarily depend on an individual's PL length while also incorporating the partner's PL length

[25]Paternity leave, on the other hand, has been highly limited, with a maximum duration of only a few days, as discussed in Appendix D. Thus, we abstract from it in the model.

[26]However, this feature is not included in the baseline model, which is calibrated to the period before these reforms. Details on how we model the incentive program are provided in Section 6.1.

(i.e., $\mathbf{l} \equiv (l_f, l_m)$). For the baseline calibration prior to recent reforms, this structure enables a more generous cap on maternity leave, similar to the wage replacement rate, as explained above.[27] Specifically, since the first two months of maternity leave are not subject to a cap, while the third month is subject to a cap, we assume that the maternity leave benefit for a quarter enters the PL benefits in the following way:

$$\mathcal{B}(\mathbf{l}, \mathbf{w}) = \underbrace{w_f \times \min\{l_f, 2/3\} + \min\{w_f \times \max(0, l_f - 2/3), \bar{\Theta}_f\}}_{\text{maternity for women}} \\ + \underbrace{\max\left\{\underline{\Theta}, \min\{\tilde{\theta} w_f, \overline{\Theta}\}\right\} \times \max\{l_f - 1, 0\}}_{\text{nonmaternity for women}} + \underbrace{\max\left\{\underline{\Theta}, \min\{\tilde{\theta} w_m, \overline{\Theta}\}\right\} \times l_m}_{\text{nonmaternity for men}}. \tag{19}$$

Here, $\bar{\Theta}_f$ is the monthly benefit cap for the final month of maternity leave, set to 0.31 (1,350K KRW).[28] Since the baseline calibration period features a flat benefit for nonmaternity PL durations, the quarterly minimum and cap are equal in the baseline calibration: $\underline{\Theta} = \overline{\Theta} = 0.27$, which corresponds to approximately 300 USD per month.[29]

As discussed in Section 4.5, our model introduces nonpecuniary stigma costs associated with using PL to reflect the widely recognized notion that employees, particularly men, often feel uncomfortable taking PL (Kim and Lundqvist, 2023). In fact, the data show that the share of parents using any PL was very low, especially among men (10.2% among mothers and only 0.1% among fathers in 2010; see Appendix Figure A6). Nevertheless, mothers who take PL tend to take leave for nontrivial durations.

Therefore, we specify this stigma cost as a combination of extensive margin costs ($\tilde{d}_{0,g}$) and intensive margin costs ($\tilde{d}_{1,g}$):

$$d(\mathbf{l}) = \sum_g [\tilde{d}_{0,g} \mathcal{I}_{l_g > 0} + \tilde{d}_{1,g} l_g], \quad \text{where} \quad \tilde{d}_{0,m} = \mu_d \tilde{d}_{0,f}, \quad \tilde{d}_{1,m} = \mu_d \tilde{d}_{1,f}. \tag{20}$$

Here, the higher intensity of this cost for men is captured by the multiplier $\mu_d > 1$. We first calibrate the two female parameters ($\tilde{d}_{0,f}$ and $\tilde{d}_{1,f}$) internally to match the share of mothers using PL (10.1%) and their average duration (2.7 quarters), conditional on PL use, as shown in Table 2.

Ideally, we would include male target moments and jointly calibrate μ_d. However, because fathers' PL use is nearly zero in the baseline calibration period, this is not

[27] This flexibility—including interdependence of caps—allows us to incorporate a recent reform that temporarily raises the cap when both spouses use PL. However, this program was introduced only recently and is not featured in the baseline calibration. Section 6.1 provides further details.

[28] Monetary values are scaled such that 1 in the model corresponds to 4,300K KRW (≈3K USD).

[29] With this restriction of a constant benefit, $\tilde{\theta}$ becomes irrelevant in the baseline economy.

feasible. We therefore adopt an alternative strategy, as outlined in Section 5.1. We first calibrate all parameters in Table 2 using a value of μ_d that ensures male PL use remains zero. To obtain a realistic value of μ_d, we then apply the more generous 2022 PL policy version, as described in Section 6.1, holding the calibrated parameters fixed except for μ_d, which is chosen to match the recent share of fathers using PL relative to mothers, shown in Figure A6. The resulting multiplier is $\mu_d = 1.94$, implying that male stigma costs are 94% higher than those of women.[30]

Wages and Labor Markets As shown in equation (14), individual wages depend on various components, which we parameterize as follows:

$$\omega_{e,j} = \tilde{\omega}_0 \exp(\tilde{\omega}_1(j-1))(1+\tilde{\omega}_e \mathcal{I}_{e_g=2}) \quad \text{and} \quad \gamma_{\chi_g} = (1+\tilde{\gamma})^{(\chi_g-1)}. \tag{21}$$

The first component of the wage function $\omega_{e,j}$ captures age and education gradients. Specifically, $\tilde{\omega}_0$ controls the scale, while $\tilde{\omega}_1$ governs the age gradient of general age-wage profiles. As relevant target statistics for these parameters, we include the average male wage at j =1, which is normalized to 1 in the model, and average nonregular job wages by gender for three age groups (j =1–5, 6–10, 11–14). Next, the college premium parameter ($\tilde{\omega}_e$), together with the female-specific wage shifter (ς) in equation (14), are internally calibrated to match mean wages by education and gender for three age groups (j =1–5, 6–10, 11–14) in the data.

In the model, regular jobs are attractive because they provide career benefits by enabling workers to move up the career status (χ_g). These promotion effects are captured by $\tilde{\chi}$, which is set to 0.2 in accordance with the promotion estimation, as detailed in Appendix B.3. Wages also depend on $\tilde{\omega}_{P,g}$, which applies only to regular job workers. This helps to match regular job wage premiums observed in the data. We internally calibrate these parameters to match average regular job wages by gender for the age groups (j =1–5, 6–10, 11–14). Finally, equation (14) also includes a job quality shock, assumed to be drawn from a log-normal distribution: $z_g \sim \log N(0, \sigma_z^2)$. The dispersion parameter σ_z is internally calibrated to match the observed standard deviation of log wages, as reported in Table 2.

We now turn to exogenous components related to labor market transitions. In the model, regular job workers are subject to an age-dependent separation shock, ϱ_j, specified as

$$\varrho_{e,j} = \tilde{\varrho}_{e,0} \exp(\tilde{\varrho}_{e,1}(j-1)). \tag{22}$$

[30] Note that the baseline calibration remains unchanged with $\mu_d = 1.94$ as long as male PL use remains zero in the baseline period, as noted above.

Table 2: Internally Calibrated Parameters

	Value	Model	Data	Group
		Fertility Distribution: $\Pr(n = y)$, $y \in \{0, 1, 2, 3+\}$		
$\tilde{\phi}_n^{1,1}$	{0.124, 0.241, 0.320}	{0.062, 0.172, 0.609, 0.157}	{0.060, 0.162, 0.611, 0.166}	noncol. female
$\tilde{\phi}_n^{1,2}$	{0.106, 0.206, 0.267}	{0.033, 0.167, 0.709, 0.091}	{0.030, 0.165, 0.696, 0.110}	noncol. male
$\tilde{\phi}_n^{2,1}$	{0.128, 0.246, 0.320}	{0.052, 0.239, 0.616, 0.093}	{0.049, 0.237, 0.619, 0.095}	col. female
$\tilde{\phi}_n^{2,2}$	{0.108, 0.209, 0.269}	{0.045, 0.246, 0.632, 0.076}	{0.044, 0.251, 0.614, 0.091}	col. male
		Hours Worked: excluding zero, j =1–5, 6–10, 11–14		
$\tilde{v}_0$	0.0012	{6.16, 6.04, 5.56}	{5.88, 5.38, 5.10}	noncol. female
$\tilde{v}_1$	0.0204	{6.65, 6.41, 6.37}	{6.60, 6.18, 5.67}	noncol. male
		{5.37, 5.32, 4.83}	{5.15, 4.85, 4.56}	col. female
μ_v	1.511	{5.77, 5.57, 5.34}	{6.06, 5.77, 5.47}	col. male
		Employment Rates: j =1–5, 6–10, 11–14		
$\boldsymbol{\iota}_f^1$	{0.258, -0.066}	{0.300, 0.365, 0.523}	{0.233, 0.433, 0.506}	noncol. female
$\boldsymbol{\iota}_m^1$	{0.190, 0.042}	{0.790, 0.629, 0.453}	{0.811, 0.840, 0.526}	noncol. male
$\boldsymbol{\iota}_f^2$	{0.193, -0.042}	{0.407, 0.411, 0.507}	{0.419, 0.472, 0.506}	col. female
$\boldsymbol{\iota}_m^2$	{0.162, 0.040}	{0.836, 0.733, 0.580}	{0.891, 0.858, 0.581}	col. male
		Regular Job Employment Rates: j =1–5, 6–10, 11–14		
$\tilde{\varrho}_{e=1,0}$	0.064	{0.089, 0.160, 0.157}	{0.089, 0.138, 0.235}	noncol. female
$\tilde{\varrho}_{e=1,1}$	0.046	{0.478, 0.482, 0.284}	{0.366, 0.420, 0.264}	noncol. male
$\tilde{\varrho}_{e=2,0}$	0.038	{0.198, 0.243, 0.215}	{0.224, 0.234, 0.234}	col. female
$\tilde{\varrho}_{e=2,1}$	0.048	{0.575, 0.623, 0.446}	{0.580, 0.585, 0.418}	col. male
		Regular Job Entry Probability: j =2–5, 6–10		
$\tilde{\xi}_0$	0.914	{0.058, 0.051}	{0.053, 0.063}	noncol. female
$\tilde{\xi}_1$	0.017	{0.227, 0.090}	{0.261, 0.115}	noncol. male
$\tilde{\xi}_n$	0.673	{0.125, 0.071}	{0.091, 0.081}	col. female
μ_ξ	0.498	{0.390, 0.170}	{0.438, 0.243}	col. male
		Hourly Wage: j =1–5, 6–10, 11–14		
$\tilde{\omega}_{P,f}$	0.156	{1.16, 1.67, 2.04}	{1.30, 1.57, 1.72}	reg. female
$\tilde{\omega}_{P,m}$	0.074	{1.51, 2.19, 2.52}	{1.46, 2.29, 2.95}	reg. male
$\tilde{\omega}_1$	0.024	{1.08, 1.20, 1.12}	{1.04, 1.16, 1.40}	nonreg. female
		{1.23, 1.70, 1.88}	{1.34, 1.79, 1.93}	nonreg. male
$\tilde{\omega}_e$	0.259	{1.23, 1.66, 1.72}	{1.38, 1.65, 1.86}	col. female
		{1.58, 2.33, 2.57}	{1.57, 2.39, 2.94}	col. male
ς	0.298	{0.98, 1.19, 1.18}	{0.80, 1.00, 1.30}	noncol. female
		{1.21, 1.73, 1.88}	{1.16, 1.73, 2.19}	noncol. male

	Value	Model	Data	Description
ν_x	0.629	0.024	0.024	Avg. childcare spending / income
α	0.280	0.081	0.077	Avg. private educ. (per child) / income
$\tilde{d}_{0,f}$	0.0588	0.063	0.101	PL use share, female
$\tilde{d}_{1,f}$	0.0129	2.38	2.70	Avg. PL length (> 0), female
ι_b	0.525	0.666	0.698	Reg. emp. rate at birth $/ - 1$, female
ι_n	0.0094	0.735	0.675	Reg. emp. rate $+1/ - 1$, female
ϑ	0.982	0.395	0.400	Avg. retirement income / avg. hh earnings
$\tilde{\omega}_0$	0.714	1.03	1.00	Avg. male wage ($j = 1$), normalization
σ_z	0.532	0.63	0.53	Std. dev. male wage

The parameters $\tilde{\varrho}_{e,0}$ and $\tilde{\varrho}_{e,1}$ are internally calibrated to match regular employment rates by education and gender across three age groups (j =1–5, 6–10, 11–14). At the same time, entry into regular jobs is not frictionless in the model and is governed by entry costs ξ. In the data, the probability of entering a regular job declines sharply with age, likely reflecting features of Korean corporate culture and potential age discrimination, as discussed in Section 4.3. There are also notable differences by gender and education, as reported in Table 2. To replicate these patterns, we specify the distribution of entry costs to be:

$$F_{e,g,j}(\xi; n) \sim U\left[0,\ \bar{\xi}_{g,j}(n)\,\bar{\xi}_e\right], \tag{23}$$

$$\text{where} \quad \bar{\xi}_{g,j}(n) \equiv \tilde{\xi}_0 \exp\left(\tilde{\xi}_1(j-1)\right)\left(1 + n\tilde{\xi}_n \mathcal{I}_{\{g=f\}}\right), \quad \bar{\xi}_e \equiv \mu_\xi \mathcal{I}_{\{e=2\}} + \mathcal{I}_{\{e=1\}}. \tag{24}$$

This specification allows us to capture age-dependence through $\tilde{\xi}_0$ and $\tilde{\xi}_1$, the effect of children for mothers through $\tilde{\xi}_n$, as well as lower entry costs for the more educated through μ_ξ. We internally calibrate these entry cost parameters using the average regular entry probability by education and gender across two age groups (j =2–5, 6–10).[31]

Finally, we estimate the transition matrix $\pi(\chi'|\chi, (P, P), \mathbf{h})$, which governs the mapping from current labor supply to promotion probability, directly from the data. The key property of this transition matrix is that the probability of promotion increases with labor supply, while the probability of demotion decreases with labor supply. We specify this relationship as follows:

$$\pi^{motion}_{P,g,j}(h_g) = \left[1 + \left(\frac{1}{\Pi^{motion}_{P,g,j}} - 1\right)\exp\left(-\zeta^{motion}_P (h_g - 5)\right)\right]^{-1}, \tag{25}$$

where $motion$ denotes either promotion (u) or demotion (d), and $\Pi^{motion}_{P,g,j}$ is the probability of promotion or demotion, conditional on $h_g = 5$, which corresponds to the modal working hours for both female and male workers in regular jobs. We classify groups along two dimensions: gender and broad age groups (j =1–10, 11–14). The parameter ζ^{motion}_P is estimated using logistic regressions with fixed effects by household, gender, and broad age group. The estimated coefficient for promotion is 1.23, while for demotion, it is –1.37, both of which are statistically significant at the 1% level, based on clustered standard errors. Details are provided in Appendix B.3.

[31]We exclude the first period because the model imposes initial conditions where all individuals begin without regular job experience.

Consumption and Labor Supply The utility function for consumption follows the standard form:

$$u(c/\Lambda(n)) = \frac{(c/\Lambda(n))^{1-\sigma_c}}{1-\sigma_c}, \tag{26}$$

where we set the inverse elasticity of intertemporal substitution to $\sigma_c = 2$, a commonly adopted value in the literature. The equivalence scale, $\Lambda(n) = 1.5 + 0.3n$, follows the OECD modified equivalence scale.[32] Old-age income is assumed to depend on final career status and education level, scaled by ϑ, as specified in Appendix C. This parameter is internally calibrated to match 0.4, the ratio of average old-age household income to average household earnings. Finally, we set the discount factor to $\beta = 0.92$ and the two-year real interest rate to $r = 0.1$ externally.

We categorize total hours worked over a two-year model period into 9 bins, where each nonzero bin corresponds to an additional 9 weekly hours.[33] For example, a value of 5 indicates that average weekly hours worked is greater than 36 and less than or equal to 45, corresponding to typical full-time work conditional on employment. This is set as the minimum required labor supply for regular jobs, $\underline{h}_P$.

Next, we specify the disutility of labor supply as a combination of the standard constant-Frisch-elasticity function for the intensive margin of labor supply and participation costs for the extensive margin, both with age-dependent shifters:

$$\begin{aligned} v(\mathbf{h}, \mathbf{e}, s_f, n, b, j) = \sum_g \left[\begin{array}{c} v_{e_g}\tilde{v}_0\big(1+\iota_b \mathcal{I}_{\{b=1,\, s_f=P\}}\big)\exp\big((j-1)\tilde{v}_1\big)\frac{h_g^{1+\sigma_h}}{1+\sigma_h} \\ +\iota_{0,g}^{e_g}\exp\big((j-1)\iota_{1,g}^{e_g}\big)\mathcal{I}_{\{h_g>0\}} \end{array} \right] \\ + \iota_n(b+n)\,\mathcal{I}_{\{h_f>0,\, s_f=P\}}. \end{aligned} \tag{27}$$

The parameter σ_h represents the inverse of Frisch elasticity and is set to 2, as is standard in the literature. We assume that disutility shifters for the intensive margin depend on age, while those for the extensive margin depend on both age and gender. These parametric assumptions are motivated by the labor supply patterns documented in Figure 2, which show that the intensive margin declines with age in a parallel manner across genders, whereas the age gradient in the extensive margin differs sharply by gender. In addition, the intensive margin shifters exhibit education dependence, captured by v_{e_g}, which takes the value μ_v if $e_g = 2$ (college) and 1 if $e_g = 1$ (noncollege). This specification reflects the empirical observation that, despite higher wages among

[32]This scale assigns a value of 1 to the adult head, 0.5 to an additional adult, and 0.3 to each child.

[33]See Appendix B.3 for exact categorization formulas. This process helps mitigate measurement errors and, more importantly, ensures consistency with the discrete labor supply choices in the model.

college-educated workers, hours worked per worker differ little across education levels. These labor disutility parameters for both the intensive and extensive margins are internally calibrated to match total hours worked by gender and education, as well as employment rates by gender and education across three age groups (j =1–5, 6–10, 11–14), as reported in Table 2.

Finally, as discussed in Section 4.3, to capture the inflexibilities of regular jobs that can arise when young children are present, mothers with a newborn experience a shift in the disutility shifter ι_b, and mothers who choose to work in a regular job face an additional participation cost per child in the household, denoted by ι_n. These two child-related cost parameters are internally calibrated to match (i) the ratio of mothers' regular-job employment rate at birth relative to the pre-birth period and (ii) the ratio of mothers' regular-job employment rate one period after birth relative to the pre-birth period. Together, these moments capture the magnitude of motherhood penalties in regular-job attachment.

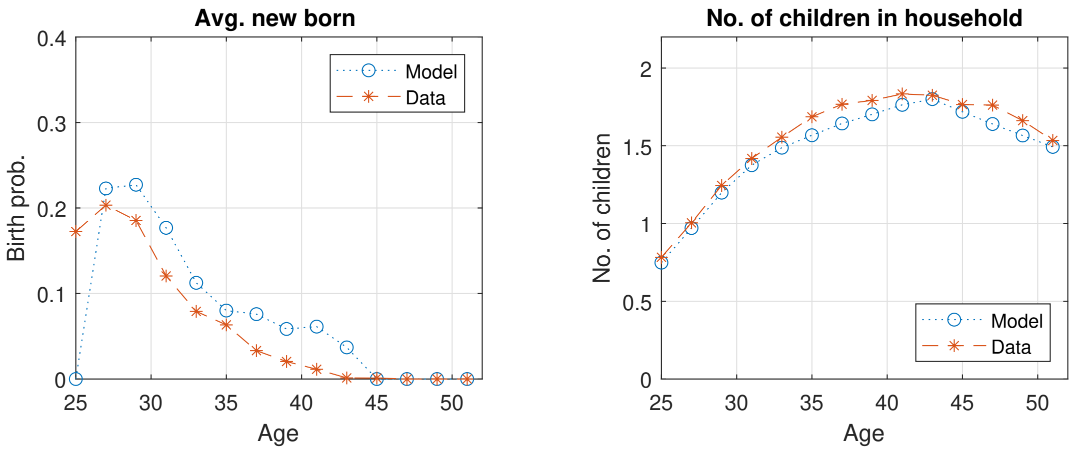
Tax and Transfers The tax function net of transfers is given by:

$$\mathcal{T}(\mathbf{h}, a, \mathbf{w}) = \sum_g \left[E_g - (1-\tilde{\tau}_s)E_g^{1-\tilde{\tau}_p}\bar{E}^{\tilde{\tau}_p}\right] + \tilde{\tau}_k ra - T, \tag{28}$$

where E_g denotes individual earnings, $\bar{E}$ denotes the economy-wide average earnings, and T represents lump-sum transfers. The capital income tax rate is set to $\tilde{\tau}_k = 0.14$, and T, which captures various welfare programs, is set at 10% of average household income. The progressive labor income tax follows the functional form of Heathcote et al. (2017). Since the Korean National Tax Service does not allow joint filing, we apply this function separately to each partner. We set $\tilde{\tau}_p = 0.175$ for progressivity and $\tilde{\tau}_s = 0.169$ for scale, based on Lim and Kim (2023).

Initial Distributions We take the initial distribution of couples' education and their corresponding number of children directly from the data, as summarized in Appendix Table A1. Two patterns are worth noting. First, college-educated individuals are more likely to marry partners with similar education levels, reflecting a strong pattern of educational assortative matching, similar to what is observed in the United States (Greenwood et al., 2014). Second, more educated parents tend to have fewer children at younger ages, suggesting a negative relationship between education and early fertility. This pattern may be driven by delayed family formation among highly educated individuals, as many choose to spend more than four years completing higher education

Figure 6: Children in Households by Age



(officially a four-year college degree) in Korea.[34]

5.3 Calibration Results and Model Fit

Table 2 summarizes the internally calibrated parameters, their target statistics, and the fit between model-implied and empirical statistics. Despite a high degree of overidentification, the model matches the target statistics well. We now examine the model fit in greater detail, focusing on the key dimensions outlined in Section 3.

The left panel of Figure 6 displays the childbirth probability within two-year periods, capturing the timing of births, while the right panel shows the average number of children by age. In the model, these dynamics are shaped by both fecundity—externally calibrated through equation (18)—and endogenous fertility choices. The model's statistics align well with the data across all ages. Note that up to age 45, these moments are not directly targeted in calibration, as the calibration targets include only the distribution of completed fertility rather than the timing of births. In contrast, the declining trend after age 45 is more directly calibrated, as its slope is calibrated to match the data through p_n, as discussed in Section 5.2.

Panel (a) of Figure 7 presents the age profile of labor supply by gender. While we only targeted the average over the three broad age groups, the model successfully replicates more detailed two-year age patterns. In particular, as highlighted in Section 3, the model captures the key empirical pattern where female labor supply increases with age as childbearing and childcare responsibilities decline, whereas male labor supply

[34]Additionally, most men in Korea are required to complete mandatory military service, which lasts approximately two years (recently reduced to 1.5 years) and is typically served during their college years, further contributing to delayed marriage and family formation among the college-educated.

Figure 7: Labor Supply, Job, and Wage by Age and Gender

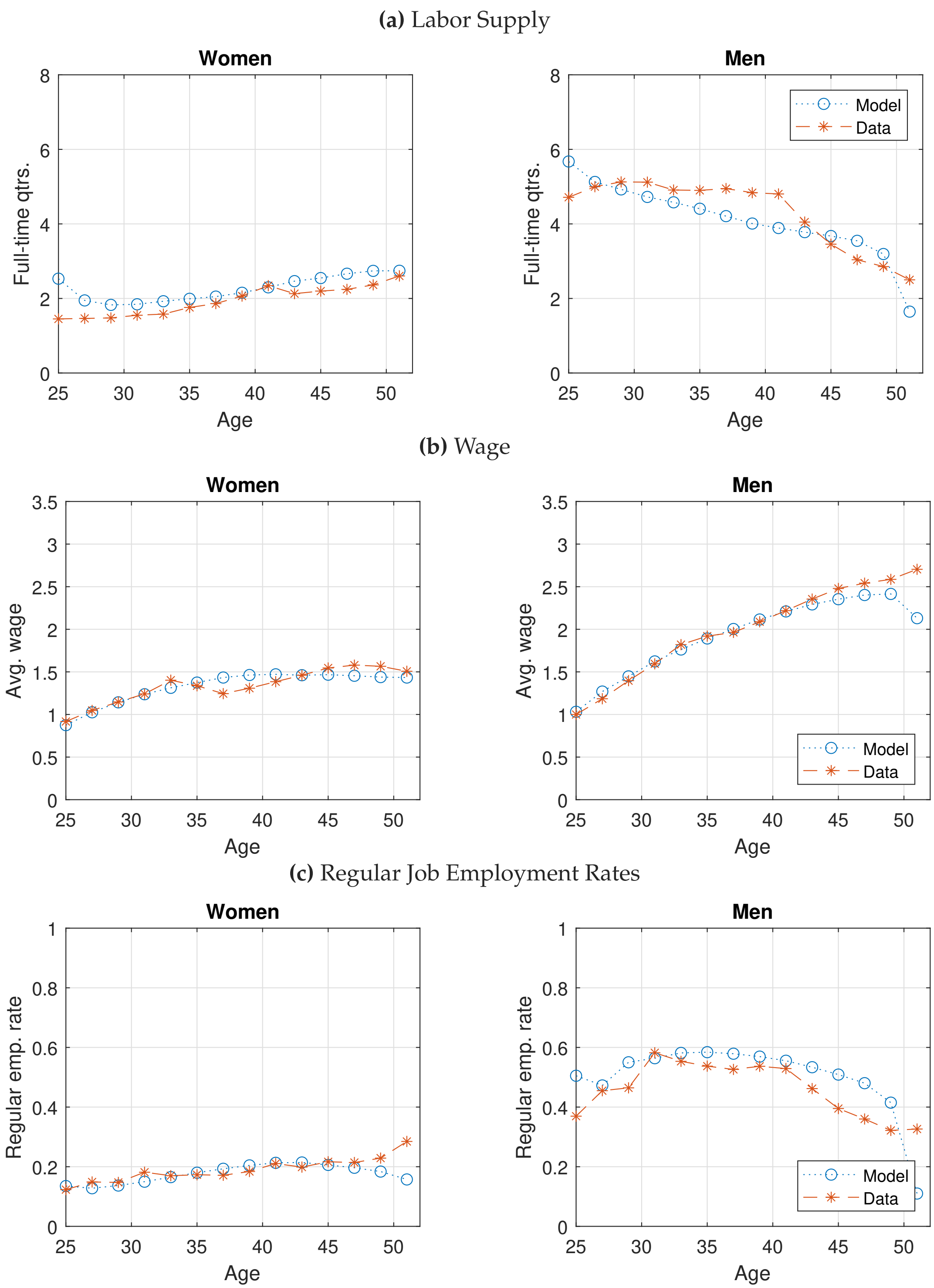
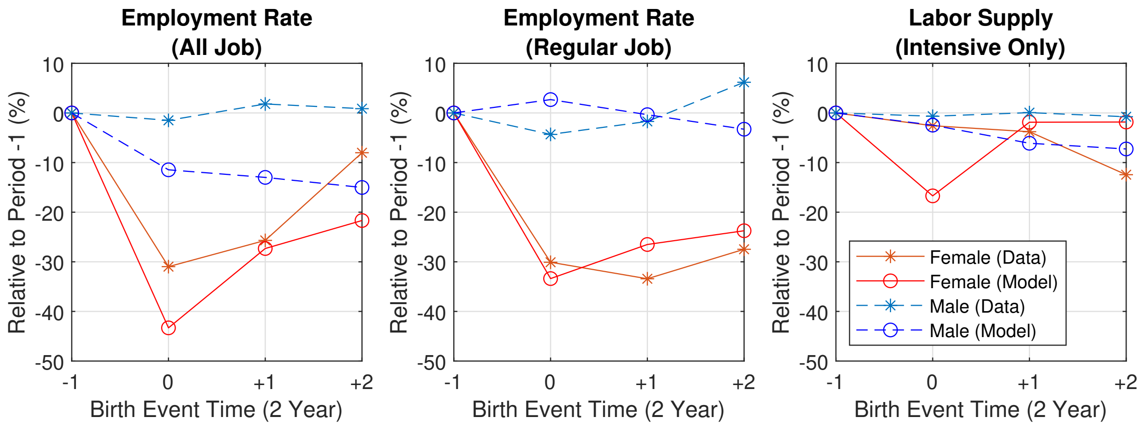


Figure 8: Labor Supply and Career Changes Around Childbirth: Model and Data



tends to decrease, particularly after the 40s. Table 2 further shows that a modestly higher disutility of work for college-educated individuals ($\mu_v = 1.022$) helps the model reproduce slightly lower hours per worker among the college educated, despite large wage gaps between college- and noncollege-educated workers.

Panel (b) of Figure 7 plots the age profile of wages by gender, which is largely disciplined by internal calibration, subject to the parsimonious parametric assumptions in equations (14) and (21). The model successfully reproduces the widening gender wage gap over the life cycle. The gender wage gap in the model is endogenously driven by various model mechanisms, as well as the female-specific wage shifter ($\varsigma = 0.298$).

Relatedly, panel (c) of Figure 7 presents regular job employment rates by gender over the life cycle. The model successfully replicates the key pattern that regular job employment rates remain consistently low for women throughout the life cycle, whereas men exhibit significantly higher rates, particularly at younger ages. In the model, these patterns arise due to structural barriers such as entry costs for regular jobs that increase with age ($\tilde{\xi}_0 = 0.914$, $\tilde{\xi}_1 = 0.017$) and career interruptions from childrearing, which disproportionately limit women's access to career-oriented jobs.

Figure 8 compares model-generated and empirical patterns of labor supply around childbirth. It plots employment rates (overall and in regular jobs only) and the intensive margin relative to the pre-birth period (period -1) for mothers and fathers in the birth period (0) and the subsequent periods. In both the model and the data, women experience a sharp and persistent decline in regular-job employment at childbirth, with drops of roughly 30 percent. The decline at the overall extensive margin is quantitatively much larger than the corresponding change in the intensive margin, indicating that employment losses, rather than reductions in hours among the employed, drive much of the sizable labor supply change, consistent with (Stansbury et al., 2024). By contrast, men exhibit only minor changes around childbirth, with regular-job employment remaining close to pre-birth levels in both the model and the data.

6 Quantitative Results

This section uses our calibrated model to investigate the impact of PL policy reforms on labor supply, gender gaps, and fertility, presenting the main quantitative exercises.

6.1 PL Policy Reforms and Computational Experiment Design

As discussed in Section 5, given the timing of childbearing for the baseline cohort (women born in 1970–75), the baseline model sets PL benefits at approximately 400K KRW (300 USD) per month. As detailed in Appendix D, monetary PL benefits were first introduced in 2001 and gradually increased over time. While the benefit amount was adjusted incrementally, the overall structure remained flat, with no major reforms to the replacement rate or maximum duration. In recent years, the Korean government has expanded PL policy benefits along various dimensions. Accordingly, our quantitative experiments in this section focus on two major policy shifts, referred to as the 2022 Reform and the 2025 Reform.

2022 Reform Our first reform counterfactual considers a version implemented in 2022, characterized by the following key features.

Since 2011, PL benefits have undergone a crucial transition from a flat-rate to an earnings-dependent system (Kim et al., 2023), similar to the 2007 maternity leave reform in Germany (Raute, 2019), with replacement rates improving several times over the following years. The first feature of the 2022 reform is that, unlike the flat, limited benefits, workers receive PL benefits with a replacement rate of 80% ($\tilde{\theta} = 0.8$), subject to a minimum and a cap. As detailed in Appendix D, the minimum was raised to approximately 1.5 times the baseline flat benefit (inflation-adjusted), while the maximum was increased to about 3.1 times the baseline flat benefit: $\underline{\Theta}' = 1.5 \times \underline{\Theta}$ and $\overline{\Theta}' = 3.1 \times \overline{\Theta}$. Additionally, the maternity leave cap for the third month was increased by 20% in real terms, approximately 1.2 times the baseline: $\overline{\Theta}'_f = 1.2 \times \overline{\Theta}_f$.

Secondly, we also consider the *3+3 program*, introduced in 2022 to encourage joint PL usage in response to low take-up rates among male parents. Under this program,

Table 3: Effects of PL Policy Reforms in the Benchmark Economy

	Labor Supply						Fertility	Parental Leave			
	Female (by j)			Male (by j)				Users (%)		Length(>0)	
	1-5	6-10	11-14	1-5	6-10	11-14	Rate	Female	Male	Female	Male
Baseline	2.01	2.19	2.67	5.01	4.06	3.02	1.80	6.3	0.0	2.4	n/a
Experiments											
	% change relative to the baseline										
2022 reform	*0.4*	*1.2*	*0.1*	*-1.4*	*-0.5*	*-0.3*	*6.6*	24.4	1.9	4.6	4.0
2025 reform	*0.8*	*1.1*	*0.2*	*-1.5*	*-0.8*	*-0.3*	*8.6*	28.0	4.8	4.5	4.0

Notes: Italicized numbers indicate the effects of PL reforms, expressed as percentage changes relative to the baseline economy. The last four columns report levels for each economy.

when both parents take PL—three months per parent (hence the name, *3+3 program*)—the replacement rate increases to 100%, and the benefit cap is significantly raised to approximately 6.3 times the baseline flat benefit: $\overline{\Theta}' = 6.3 \times \overline{\Theta}$.

2025 Reform In the next reform counterfactual—the 2025 reform—we additionally consider the more generous caps included in the reform package implemented in 2025, following policy debates over the adequacy of the benefit cap. Specifically, the new caps are higher but decrease gradually with leave duration: the first and second quarter caps are 5.2 and 4.2 times the baseline flat benefit ($\overline{\Theta}'_1 = 5.2 \times \overline{\Theta}$ and $\overline{\Theta}'_2 = 4.2 \times \overline{\Theta}$), while the cap for the third quarter and beyond is 3.3 times the baseline ($\overline{\Theta}'_3 = 3.3 \times \overline{\Theta}$).

6.2 Benchmark Effects of PL Reforms on Labor Markets and Fertility

Effects on Gender Gaps in Labor Supply and Fertility Table 3 reports the effects of the two PL policy reforms described in Section 6.1, evaluated using the calibrated baseline economy, on labor supply by gender across three age groups ($j = 1$–5, 6–10, 11–14), as well as on fertility and PL usage.

A key finding is that the PL reforms simultaneously narrow the gender gap in labor supply and increase fertility. These effects arise together with higher PL use: under the 2022 reform, the model implies a rise in mothers' PL use to 24.4%, which accounts for a substantial share of the observed increase in 2022 (see Figure A6). Female labor supply rises most strongly in the early working years and remains higher over the life cycle. Fertility also increases, with completed fertility rising by 6.6% under the 2022 reform and 8.6% under the 2025 reform.

At first glance, these results may appear at odds with the predictions of the static

Table 4: Heterogeneous Policy Effects

	Lifetime Labor Supply (max: 1)								Completed Fertility			
	Female				Male							
$e_f =$	1	1	2	2	1	1	2	2	1	1	2	2
$e_m =$	1	2	1	2	1	2	1	2	1	2	1	2
Baseline	0.33	0.18	0.44	0.26	0.55	0.59	0.37	0.48	1.86	1.86	1.75	1.74
Experiments												
	% change relative to baseline											
2022 reform	*0.9*	*-0.1*	*-0.7*	*0.8*	*-1.1*	*-0.5*	*0.7*	*-1.0*	*3.6*	*1.7*	*14.9*	*9.7*
2025 reform	*1.2*	*0.9*	*0.5*	*0.1*	*-1.6*	*-0.9*	*-3.9*	*-0.1*	*6.5*	*1.8*	*24.3*	*10.5*

Notes: Lifetime labor supply is calculated as the sum of total labor supply over the lifetime, divided by the maximum possible labor supply. $e_g = 1$ denotes noncollege-educated, and $e_g = 2$ denotes college-educated. Italicized numbers indicate the effects of PL reforms, expressed as percentage changes relative to the baseline economy.

model in Section 2, where more generous PL benefits are constrained by a time-allocation trade-off that precludes achieving both higher fertility and narrower gender gaps. Indeed, as shown in Appendix Table A4, young women experience sizable declines in labor supply at the *intensive margin* (–3 to –4%) due to higher birth rates and increased childcare demands. The key distinction in our dynamic life-cycle framework is that PL generates additional effects by mitigating career and employment losses around childbirth and supporting subsequent career progression. As a result, *lifetime* female labor supply rises even as fertility increases.

Fathers' PL use increases, but only modestly: under the 2025 reform, about 5% of fathers take PL. We examine the role of the *3+3 program*, an incentive-based policy included in the reforms to encourage fathers' leave use, described in Section 6.1. We find that the program has a modest effect, increasing fathers' PL use from 4.4% in its absence to 4.8% under the 2025 reform benefits (see Appendix Table A6). Appendix E.1 provides a detailed analysis of policies aimed at inducing greater paternal PL use.

Heterogeneous Effects of PL Reforms The impact of policy reforms may vary across education groups. We examine heterogeneity in labor supply and fertility responses by education in Table 4. The labor supply measure we focus on here is *lifetime labor supply*, calculated as the sum of total labor supply over the life cycle, divided by the maximum possible labor supply.

Table 4 shows that, across education groups, the reforms reduce gender gaps in lifetime labor supply, with particularly pronounced convergence under the 2025 reform.

Table 5: Effects of PL Reforms on Career Dynamics

Panel A. Job Dynamics by Gender

	Reg. Emp Rate						Nonreg. Emp Rate					
	Female (by j)			Male (by j)			Female (by j)			Male (by j)		
	1-5	6-10	11-14	1-5	6-10	11-14	1-5	6-10	11-14	1-5	6-10	11-14
Baseline	0.14	0.20	0.19	0.53	0.56	0.38	0.21	0.19	0.33	0.28	0.13	0.15
Experiments												
	% change relative to the baseline											
2022 reform	*14.5*	*4.5*	*0.4*	*-1.8*	*-0.9*	*-0.5*	*-3.1*	*-1.0*	*0.0*	*-0.5*	*0.8*	*-0.2*
2025 reform	*17.2*	*6.5*	*1.5*	*-1.6*	*-1.0*	*-0.2*	*-4.1*	*-2.0*	*-2.5*	*-0.8*	*1.1*	*0.4*

Panel B. Wage Dynamics by Gender

	Avg. Wage						Avg. Reg. Wage					
	Female (by j)			Male (by j)			Female (by j)			Male (by j)		
	1-5	6-10	11-14	1-5	6-10	11-14	1-5	6-10	11-14	1-5	6-10	11-14
Baseline	1.12	1.44	1.45	1.43	2.10	2.33	1.16	1.67	2.04	1.51	2.19	2.52
Experiments												
	% change relative to the baseline											
2022 reform	*-0.6*	*0.6*	*0.9*	*0.3*	*0.1*	*0.1*	*-1.6*	*0.4*	*1.5*	*0.1*	*0.1*	*0.3*
2025 reform	*-0.3*	*0.8*	*1.1*	*0.3*	*0.3*	*0.4*	*-1.1*	*0.4*	*1.5*	*0.2*	*0.3*	*0.6*

Notes: Panel A reports the effects on employment rates, while Panel B reports the effect on wages. Wages are normalized such that the male wage in $j = 1$ is set to one. Italicized numbers indicate the effects of PL reforms, expressed as percentage changes relative to the baseline economy.

Fertility responses are substantially stronger among college-educated women. This pattern is consistent with Raute (2019), who studies Germany's transition from a flat benefit to an earnings-dependent system, similar to those considered here, and finds larger fertility responses among highly educated women. Because higher fertility increases job inflexibility pressures, lifetime labor supply gains for highly educated women are more muted, illustrating that the conventional time-allocation trade-off reemerges at a more disaggregated level.

Dynamic Career-Retention Channel We now illustrate the mechanism—the career-retention channel—through which female labor supply increases, particularly in the long run, while fertility also rises. To this end, Table 5 presents key policy effects on career dynamics over the life cycle, including job choices and wage profiles.

Panel A of Table 5 shows a sizable and persistent increase in women's regular-job employment, indicating greater participation in career-oriented positions. This rise reflects both transitions from nonregular to regular jobs, as evidenced by the decline in nonregular-job employment, and new entries from nonemployment. More generous PL policies facilitate these shifts primarily through their job-protection role, which helps women overcome the minimum-hours requirements associated with regular jobs—constraints that disproportionately bind mothers facing greater childcare demands. Without PL, labor force exits around childbirth make re-entry into regular jobs difficult, especially at old ages due to high entry costs, pushing many women into nonregular work. Therefore, more generous PL benefits raise the returns to remaining in or entering career-oriented jobs, especially for women.

These career-oriented shifts also contribute to narrowing gender *wage* gaps, as shown in Panel B of Table 5. In the short run, however, PL reforms lead to a decline in the average wages among young female workers. This reflects the immediate career costs of taking PL, which are especially pronounced in regular jobs. As discussed in Sections 4.3 and 4.4, PL use reduces *actual* labor supply, slowing promotions and increasing demotion risks, thereby lowering average wages at younger ages. Over time ($j = 6$–14), female wages begin to rise, particularly among regular-job workers, because PL allows them to avoid career interruptions during earlier periods and remain attached to high-paying, career-oriented jobs. As a result, lifetime earnings increase and gender wage gaps narrow.

6.3 The Role of Job Protection and Labor Market Segmentation

The policy experiments in the previous section demonstrate that more generous PL benefits can simultaneously increase fertility and narrow life-cycle gender gaps in labor supply and wages. To explicitly quantify the underlying institutional features behind the main mechanism for shaping the PL reform effects, we consider two counterfactual economies: (i) one in which PL does not provide job protection ("w/o protection") and (ii) one without labor market segmentation ("w/o segment").

The Role of Job Protection First, we illustrate the importance of the PL job-protection by conducting the 2025 PL reform in an economy where PL does not support career retention ("w/o protection"). In this counterfactual economy, taking leave provides the same benefit payments but no longer relaxes the minimum-hours requirement for retaining a regular job. Specifically, leave duration l_g no longer counts toward the minimum work requirement $\underline{h}_P$: the retention condition becomes $\underline{h}_P \leq h_g$ rather than $\underline{h}_P \leq h_g + l_g$.

Table 6: Parental Leave Job Protection and Labor Market Segmentation

	Labor Supply						**Fertility**	**Parental Leave**			
	Female (by j)			Male (by j)				Users (%)		Length(> 0)	
	1-5	6-10	11-14	1-5	6-10	11-14	**Rate**	Female	Male	Female	Male
Baseline											
Benchmark	2.01	2.19	2.67	5.01	4.06	3.02	1.80	6.3	0.0	2.4	n/a
Alternative PL structure / labor market											
w/o protection	2.01	2.19	2.67	5.00	4.05	3.01	1.78	4.7	0.0	1.4	n/a
w/o segment	2.56	2.86	3.01	4.89	3.75	2.66	2.16	3.6	0.5	2.0	3.9
Experiments: 2025 reform											
	% change relative to the corresponding baseline										
Benchmark	*0.8*	*1.1*	*0.2*	*-1.5*	*-0.8*	*-0.3*	*8.6*	28.0	4.8	4.5	4.0
	(-3.6)	*(-1.3)*	*(0.0)*	*(-0.4)*	*(0.0)*	*(0.0)*					
Alternative PL structure / labor market											
w/o protection	*4.4*	*2.8*	*0.9*	*-2.0*	*-3.5*	*-4.3*	*1.7*	21.5	0.2	3.0	3.0
	(-0.2)	*(-0.2)*	*(0.0)*	*(-0.1)*	*(-0.1)*	*(0.0)*					
w/o segment	*-9.0*	*1.1*	*0.6*	*-4.1*	*-0.9*	*-0.9*	*3.9*	45.5	9.8	4.8	4.0
	(-10.2)	*(-0.2)*	*(0.0)*	*(-1.4)*	*(0.0)*	*(0.0)*					

Notes: "w/o protection" indicates that PL use is not counted as working period and therefore does not reduce the minimum required working period for regular jobs ($\underline{h}_P \leq h_g$, not $\underline{h}_P \leq h_g + l_g$). "w/o segment." refers to the absence of entry barriers for regular jobs, i.e., zero entry cost for regular job positions ($\xi_g = 0$). Italicized numbers indicate the effects of PL reforms, expressed as percentage changes relative to the corresponding baseline economy. For labor supply, intensive-margin changes are shown in parentheses.

Table 6 shows that the removal of job protection substantially reduces PL use among women. In the baseline economy, the share of women using PL falls from 6.3% in the benchmark model to 4.7% in the "w/o protection" case. Although the 2025 reform still raises PL use in this environment, the increase is markedly smaller, reaching only 21.5%, compared with 28.0% in the benchmark. Absent the career-retention incentive provided by job protection, the reform's effect on fertility is sharply attenuated: completed fertility rises by only 1.7%—significantly lower than an 8.6% increase in the benchmark. These results demonstrate that job protection provided by PL is a central mechanism underlying both higher fertility and narrower gender gaps in the benchmark model.

The Role of Labor Market Segmentation We next examine how Korea's segmented labor market, characterized by high entry costs into regular jobs, shapes the impact of PL policy. To this end, we consider a counterfactual economy without entry barriers to regular jobs ("w/o segment"), allowing workers to move into regular jobs without paying entry costs ξ.

Table 6 reveals important patterns. In the counterfactual economy without labor market segmentation, entry into regular jobs becomes much easier, female labor supply rises substantially over the life cycle, and completed fertility increases markedly (2.16) in the baseline.[35] This result highlights that labor market segmentation itself constitutes a major constraint on both female labor supply and fertility in Korea.

Equally important, we find that the effects of the reform are fundamentally altered in the absence of labor market segmentation. The fertility response is substantially dampened, rising by only 3.9% (compared with 8.6% in the benchmark). Even more strikingly, the reform reverses its impact on female labor supply. Although the reform dramatically increases women's PL use (from 3.6% to 45.5%), this expansion comes at a significant cost. Table 6 shows that young female labor supply (j =1–5) declines by 9.0%, and that *lifetime* female labor supply falls across all education groups, as shown in Appendix Table A5. These results reveal a trade-off that emerges when labor market segmentation is absent: when regular jobs are easy to re-enter, generous PL strongly encourages women to take leave but no longer delivers the long-term career-retention benefits that sustain labor supply, resulting in a net decline in female labor supply.[36]

6.4 Gauging Parental Leave Effects for Recent Cohorts

Our benchmark model is calibrated to the most recent cohorts who have completed their working years (women born between 1970 and 1975), and the policy effects we have found so far are therefore based on these cohorts. At the same time, policy interest naturally extends to how PL reforms may operate for younger cohorts. Recent cohorts have experienced notable changes. To assess how these developments may interact with PL policies, we consider alternative model economies that incorporate several prominent recent trends.

The Role of Higher Demands for Private Education Korea is a prominent example of a society with an intense emphasis on education, often described as "education fever" (Kim et al., 2024). Unlike most European countries, Korea exhibits exceptionally high levels of private education spending, which have continued to rise in recent years. Appendix Figure A7 illustrates this trend: although average private education spending

[35] With regular jobs no longer hard to regain, the value of job-protected leave diminishes, and the share of women using PL in the baseline falls to 3.6% (compared to 6.3% in the benchmark economy).

[36] Interestingly, in the "w/o segment" economy, fathers are more likely to use PL both in the baseline (0.5%) and under the reform (9.8%) than in the benchmark economy. This suggests that labor market segmentation also discourages fathers' PL use.

Table 7: Parental Leave Effects in Alternative Economies

	Labor Supply						Fertility	Parental Leave			
	Female (by j)			Male (by j)			Fertility	Users (%)		Length(>0)	
	1-5	6-10	11-14	1-5	6-10	11-14	Rate	Female	Male	Female	Male
Baseline											
Benchmark	2.01	2.19	2.67	5.01	4.06	3.02	1.80	6.3	0.0	2.4	n/a
Alternative economy											
with high α	2.13	2.30	2.74	4.93	3.86	2.85	1.42	10.9	0.0	1.5	n/a
with $n_{j=1}=0$	2.00	2.27	2.72	4.64	3.75	2.77	1.62	6.3	0.0	2.6	n/a
with $\lambda_f=\lambda_m$	2.05	2.24	2.71	4.98	4.09	3.12	1.79	6.5	0.0	2.3	n/a
Experiments: 2025 reform											
	% change relative to the corresponding baseline										
Benchmark	*0.8*	*1.1*	*0.2*	*-1.5*	*-0.8*	*-0.3*	*8.6*	28.0	4.8	4.5	4.0
Alternative economy											
with high α	*2.1*	*1.8*	*0.7*	*-1.1*	*-1.3*	*-1.3*	*10.8*	36.4	0.8	4.3	4.0
with $n_{j=1}=0$	*1.7*	*2.0*	*0.2*	*-2.9*	*-1.5*	*-1.1*	*13.2*	29.2	5.0	4.5	4.0
with $\lambda_f=\lambda_m$	*0.7*	*1.1*	*0.1*	*-1.4*	*-0.8*	*-0.4*	*8.9*	28.7	5.0	4.5	4.0

Notes: Italicized numbers indicate the effects of PL reforms, expressed as percentage changes relative to the corresponding baseline economy.

per child has been substantial for several decades, it has increased by nearly 50% in real terms over the past ten years. To capture this heightened demand for private education, we consider an alternative economy with elevated private education expenditures. Specifically, we increase α by 30% relative to its calibrated value in the baseline model, which raises the ratio of private education spending x_q to household income by 36%.

As Table 7 shows, this modification brings the model in line with Korea's recent trends: baseline completed fertility drops markedly from 1.80 to 1.42, and female labor supply increases. In this low-fertility, high–child-cost environment, the effects of the 2025 PL reform on fertility and gender gaps remain broadly similar to the benchmark. The fertility increase is 10.8%, and the reform generates even stronger female labor supply responses.

The Role of Lower Initial Number of Children A well-documented feature of Korea's recent fertility decline is the substantial delay in childbearing. Unlike the 1970–75 benchmark cohort, more recent cohorts increasingly enter early adulthood without children. To capture this shift, we simulate an alternative economy in which all households begin with zero children at age 25 ($n_{j=1}=0$).

As Table 7 shows, this modification lowers the baseline fertility rate to 1.62, consistent with recent trends. More importantly, it amplifies the impact of the PL reform. The fertility increase reaches 13.2%, compared with 8.6% in the benchmark. The reform also narrows the gender gap more effectively, inducing stronger behavioral responses from both parents: female labor supply at young ages (j =1–5) rises by 1.7%, while male labor supply at those ages declines by 2.9%.

The Role of Equal Gender Norm While Korean society has traditionally held unequal social norms regarding childcare, these norms have been weakening in recent years (Kim et al., 2024). To examine the implications of this shift, we consider an alternative economy in which gender norms are equalized by setting $\lambda_f = \lambda_m = 0.35$, the average of the two benchmark calibrated parameters.

As Table 7 shows, this change has relatively modest effects on the baseline economy. Baseline fertility declines slightly (from 1.80 to 1.79), and gender gaps in labor supply narrow modestly—patterns that are again consistent with recent trends. The effects of the PL policy reform on fertility and labor supply also remain very similar to the benchmark. These results align with the empirical finding of Moon and Shin (2018), who suggest that shifts in social norms have only modest effects on gender roles in childcare unless the issue of overwork is addressed.

7 Conclusion

Motivated by South Korea's dual challenges of persistently low fertility and large gender disparities in labor markets, this paper first documents the key dimensions of these gaps over the life cycle in segmented labor markets. We then develop a structural life-cycle model of couples with endogenous fertility and career dynamics, calibrated to cohorts who experienced an earlier regime of low, flat PL benefits. The model successfully replicates key labor market behaviors and family decisions observed in the data. Using a series of policy experiments, we evaluate the effects of expanding PL benefits on fertility and labor market outcomes. Our central finding is that more generous PL benefits implemented in recent years can raise completed fertility while simultaneously narrowing gender gaps in labor supply over the life cycle and, in the long run, reducing gender wage disparities.

In our dynamic framework, these positive effects arise from a career-retention channel: job-protected leave, interacting with high entry costs to career-oriented jobs, enables more women to remain in such jobs during their childrearing years. We show that when either the job-protection role of PL or labor market segmentation is removed, the ability of PL reforms to raise fertility and reduce gender gaps is substantially weakened or even reversed. These findings help explain the mixed empirical evidence on PL reforms across countries: when labor market frictions differ, the strength of the career-retention channel—and thus the policy's effects on fertility and labor market outcomes—can vary considerably. Our model further implies that ongoing cohort-level changes, such as rising emphasis on child quality over quantity and evolving gender norms in childcare, help explain declining completed fertility and narrowing gender gaps observed in recent data, while the impact of PL reforms on completed fertility and long-term gender gaps remains qualitatively similar for younger cohorts.

Our analysis focuses on the labor-supply side, capturing the benefits and costs of PL from the household's perspective while incorporating demand-side factors in a reduced-form manner. We view this focus appropriate given our interest in evaluating statutory policy reforms in a setting where PL use has been low. As PL use rises towards levels observed in countries such as those in Scandinavia, however, demand-side mechanisms are likely to become increasingly important.[37] Since existing demand-side frameworks often rely on simplified representations of family and life-cycle decision-making, combining richer supply-side dynamics—such as those modeled here—with endogenous, detailed demand-side responses represents a challenging yet valuable direction for future research.

[37] Recent work such as Almar et al. (2025) and Bover et al. (2025) shows that firms' hiring and promotion decisions can play an important role in shaping the effects of PL policies.

References

Adda, Jérôme, Christian Dustmann, and Katrien Stevens, "The Career Costs of Children," *Journal of Political Economy*, 2017, *125* (2), 293–337.

Almar, Frederik, Benjamin Friedrich, Ana Reynoso, Bastian Schulz, and Rune M Vejlin, "Families' Career Investments and Firms' Promotion Decisions," Technical Report, National Bureau of Economic Research 2025.

Baker, Michael and Kevin Milligan, "How Does Job-Protected Maternity Leave Affect Mothers' Employment?," *Journal of Labor Economics*, 2008, *26* (4), 655–691.

Bar, Michael, Moshe Hazan, Oksana Leukhina, David Weiss, and Hosny Zoabi, "Why did rich families increase their fertility? Inequality and marketization of child care," *Journal of Economic Growth*, 2018, *23* (4), 427–463.

Becker, Gary S and Nigel Tomes, "Child Endowments and the Quantity and Quality of Children," *Journal of Political Economy*, 1976, *84* (4), S143–62.

Bick, Alexander, "The quantitative role of child care for female labor force participation and fertility," *Journal of the European Economic Association*, 2016, *14* (3), 639–668.

_ and Nicola Fuchs-Schündeln, "Taxation and Labour Supply of Married Couples across Countries: A Macroeconomic Analysis," *The Review of Economic Studies*, 10 2017, *85* (3), 1543–1576.

Borella, Margherita, Mariacristina De Nardi, and Fang Yang, "Are Marriage-Related Taxes and Social Security Benefits Holding Back Female Labour Supply?," *The Review of Economic Studies*, 03 2022, *90* (1), 102–131.

Bover, Olympia, Nezih Guner, Yuliya Kulikova, Alessandro Ruggieri, and Carlos Sanz, "Family-friendly policies and fertility: what firms got to do with it?," 2025. Unpublished Manuscript.

Bronson, Mary Ann and Deniz Sanin, "The Power of Policy Incentives: Female Labor Supply, Fertility and Parental Leave Policy Design," 2025. Unpublished Manuscript.

Choi, Sekyu, "Fertility risk in the life cycle," *International Economic Review*, 2017, *58* (1), 237–259.

Corekcioglu, Gozde, Marco Francesconi, and Astrid Kunze, "Expansions in paid parental leave and mothers' economic progress," *European Economic Review*, 2024, *169*, 104845.

Dahl, Gordon B, Katrine V Løken, Magne Mogstad, and Kari Vea Salvanes, "What is the case for paid maternity leave?," *Review of Economics and Statistics*, 2016, *98* (4), 655–670.

Daruich, Diego and Julian Kozlowski, "Explaining Intergenerational Mobility: The Role of Fertility and Family Transfers," *Review of Economic Dynamics*, 2020, *36*, 220–245.

Doepke, M. and M. Tertilt, "Chapter 23 - Families in Macroeconomics," in John B. Taylor and Harald Uhlig, eds., , Vol. 2 of *Handbook of Macroeconomics*, Elsevier, 2016, pp. 1789–1891.

Doepke, Matthias, Anne Hannusch, Fabian Kindermann, and Michèle Tertilt, "The Economics of Fertility: a New Era," in "Handbook of the Economics of the Family, Vol. 1," Elsevier, 2023, chapter 4.

Erosa, Andrés, Luisa Fuster, and Diego Restuccia, "A general equilibrium analysis of parental leave policies," *Review of Economic Dynamics*, 2010, *13* (4), 742–758.

_ , _ , Gueorgui Kambourov, and Richard Rogerson, "Hours, Occupations, and Gender Differences in Labor Market Outcomes," *American Economic Journal: Macroeconomics*, 2022, *14* (3), 543–90.

Farré, Lídia and Libertad González, "Does paternity leave reduce fertility?," *Journal of Public Economics*, 2019, *172*, 52–66.

Goldin, Claudia, "A Grand Gender Convergence: Its Last Chapter," *American Economic Review*, April 2014, *104* (4), 1091–1119.

Greenwood, Jeremy, Nezih Guner, and Guillaume Vandenbroucke, "Family Economics Writ Large," *Journal of Economic Literature*, 2017, *55* (4), 1346–1434.

_ , _ , Georgi Kocharkov, and Cezar Santos, "Marry Your Like: Assortative Mating and Income Inequality," *American Economic Review*, May 2014, *104* (5), 348–53.

_ , _ , _ , and _ , "Technology and the Changing Family: A Unified Model of Marriage, Divorce, Educational Attainment and Married Female Labor-Force Participation," *American Economic Journal: Macroeconomics*, 2016, *8* (1), 1–41.

Guner, Nezih, Ezgi Kaya, and Virginia Sánchez-Marcos, "Labor Market Institutions and Fertility," *International Economic Review*, 2024, *65* (3), 1551–1587.

_ , Remzi Kaygusuz, and Gustavo Ventura, "Rethinking the welfare state," *Econometrica*, 2023, *91* (6), 2261–2294.

Hart, Rannveig Kaldager, Janna Bergsvik, Agnes Fauske, and Wookun Kim, "Causal Analysis of Policy Effects on Fertility," *Handbook of Labor, Human Resources and Population Economics*, 2024, pp. 1–25.

Heathcote, Jonathan, Kjetil Storesletten, and Giovanni L. Violante, "Optimal Tax Progressivity: An Analytical Framework*," *The Quarterly Journal of Economics*, 06 2017, *132* (4), 1693–1754.

Hwang, Jisoo, Chulhee Lee, and Esther Lee, "Gender norms and housework time allocation among dual-earner couples," *Labour Economics*, 2019, *57*, 102–116.

—, Seonyoung Park, and Donggyun Shin, "Two birds with one stone: Female labor supply, fertility, and market childcare," *Journal of Economic Dynamics and Control*, 2018, *90*, 171–193.

Imai, Susumu and Michael P. Keane, "Intertemporal Labor Supply and Human Capital Accumulation," *International Economic Review*, 2004, *45* (2), 601–641.

Jakobsen, Katrine Marie, Thomas Høgholm Jørgensen, and Hamish Low, "Fertility and Family Labor Supply," 2024. Unpublished Manuscript.

Jang, Youngsoo and Minchul Yum, "Nonlinear occupations and female labor supply over time," *Review of Economic Dynamics*, 2022, *46*, 51–73.

Kim, Kyeongkuk, Sang-Hyop Lee, and Timothy J Halliday, "Paid childcare leave, fertility, and female labor supply in South Korea," *Review of Economics of the Household*, 2023, *21* (4), 1433–1451.

Kim, Seongeun, Michèle Tertilt, and Minchul Yum, "Status Externalities in Education and Low Birth Rates in Korea," *American Economic Review*, June 2024, *114* (6), 1576–1611.

Kim, Yeonjin and Åsa Lundqvist, "Parental Leave Reforms in South Korea, 1995–2021: Policy Translation and Institutional Legacies," *Social Politics: International Studies in Gender, State & Society*, 2023.

Kitao, Sagiri and Kanato Nakakuni, "On the Trends of Technology, Family Formation, and Women's Time Allocations," 2024. Unpublished Manuscript.

Kleven, Henrik, Camille Landais, Johanna Posch, Andreas Steinhauer, and Josef Zweimüller, "Do Family Policies Reduce Gender Inequality? Evidence from 60 Years of Policy Experimentation," *American Economic Journal: Economic Policy*, 2024, *16* (2), 110–149.

Knowles, John A, "Why are married men working so much? An aggregate analysis of intra-household bargaining and labour supply," *Review of Economic Studies*, 2013, *80* (3), 1055–1085.

Lalive, Rafael and Josef Zweimüller, "How does parental leave affect fertility and return to work? Evidence from two natural experiments," *The Quarterly Journal of Economics*, 2009, *124* (3), 1363–1402.

Leridon, Henri, "Can assisted reproduction technology compensate for the natural decline in fertility with age? A model assessment," *Human Reproduction*, 2004, *19* (7), 1548–1553.

Lim, Taejun and Aram Kim, "How Progressive Is the Most Popular Tax Scheme? The Case of South Korea," *Hitotsubashi Journal of Economics*, 2023, *64* (1), 1–17.

Malkova, Olga, "Can maternity benefits have long-term effects on childbearing? Evidence from Soviet Russia," *Review of Economics and Statistics*, 2018, *100* (4), 691–703.

Moon, Sue H and Jongtae Shin, "The Return of Superman? Individual and Organizational Predictors of Men's Housework in South Korea," *Journal of Family Issues*, 2018, *39* (1), 180–208.

Myong, Sunha, JungJae Park, and Junjian Yi, "Social norms and fertility," *Journal of the European Economic Association*, 2021, *19* (5), 2429–2466.

Olivetti, Claudia and Barbara Petrongolo, "The Economic Consequences of Family Policies: Lessons from a Century of Legislation in High-Income Countries," *Journal of Economic Perspectives*, February 2017, *31* (1), 205–30.

Raute, Anna, "Can financial incentives reduce the baby gap? Evidence from a reform in maternity leave benefits," *Journal of Public Economics*, 2019, *169*, 203–222.

Schauer, Johanna, *Labor market duality in Korea*, International Monetary Fund, 2018.

Sommer, Kamila, "Fertility choice in a life cycle model with idiosyncratic uninsurable earnings risk," *Journal of Monetary Economics*, 2016, *83*, 27–38.

Stansbury, Anna, Jacob Funk Kirkegaard, and Karen Dynan, "Gender gaps in South Korea's labour market: children explain most of the gender employment gap, but little of the gender wage gap," *Applied Economics Letters*, 2024, *31* (17), 1726–1731.

Wang, Hanna, "Fertility and Family Leave Policies in Germany: Optimal Policy Design in a Dynamic Framework," 2022. Unpublished Manuscript.

Yamaguchi, Shintaro, "Effects of parental leave policies on female career and fertility choices," *Quantitative Economics*, 2019, *10* (3), 1195–1232.

Zhou, Anson, "The Macroeconomic Consequences of Family Policies," 2022. Unpublished Manuscript.

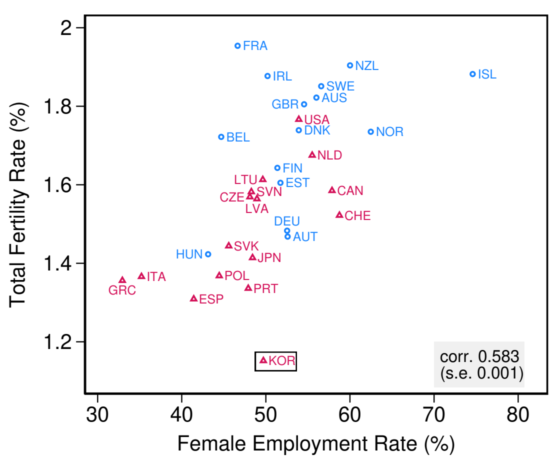
Online Appendix

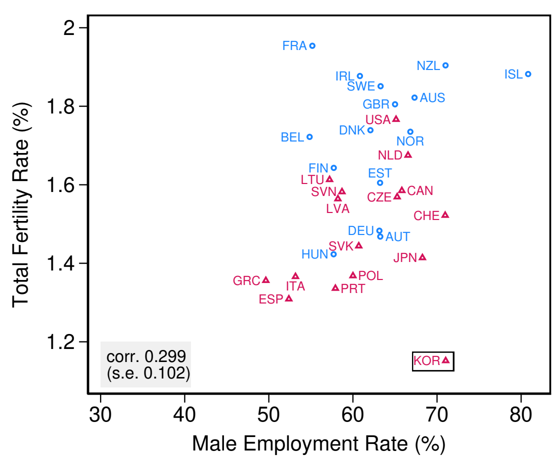
A Details on Evidence based on Aggregate Data

Work culture affects labor supply patterns for both men and women. Korea exhibits relatively high work pressure and long working hours, as documented in Section 3. Figure A1 plots the relationship between fertility and female or male employment rates separately. The left panel closely resembles the positive relationship between fertility and female labor force participation documented in Doepke et al. (2023), with the key difference being that Korea is included. As shown, female employment rates are positively associated with fertility, with a correlation coefficient of 0.58, reaffirming the findings of Doepke et al. (2023). While the corresponding correlation for male employment rates is lower (0.30), it remains positive and statistically significant.

As noted in the introduction, Figure 1 plots fertility against the female employment rate relative to the male employment rate to isolate gender gap aspects while controlling for country fixed effects related to labor supply. Fertility exhibits a stronger positive correlation with the gap between female and male employment rates, yielding a correlation coefficient of 0.65—higher than that observed for female employment alone (0.58).

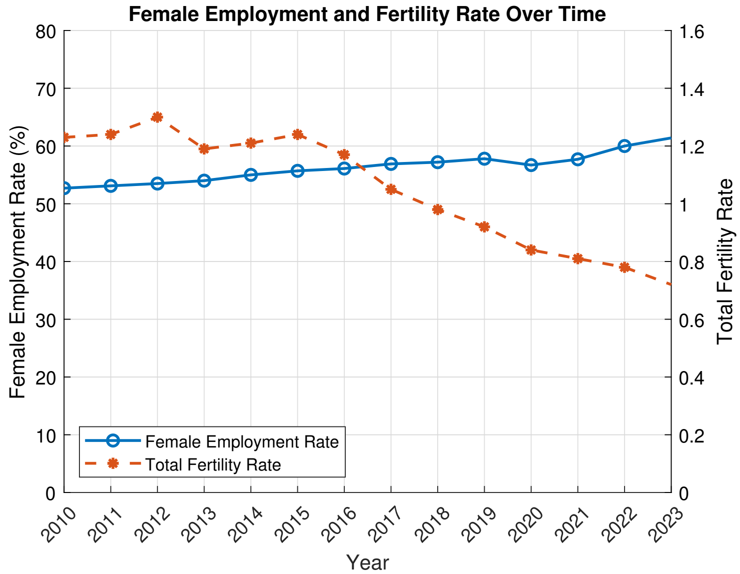
Figure A1: The Cross-Country Relationship Between Fertility and Female or Male Employment Rates





Notes: The x-axis displays the employment rate (%) of working-age females and males employed within the same subgroup. The y-axis represents the total fertility rate. Countries are categorized by public expenditure on family benefits (as a percentage of GDP): blue circles for high expenditure (ranks 1–15) and red triangles for low expenditure (ranks 16–31). Data are country averages over the period 2010–2019. Source: OECD.

Figure A2: Female Employment Rate and Fertility Over Time in Korea



Based on its location on Figure 1, one might wonder whether Korea represents a puzzling case that challenges the traditional trade-off between women's work and fertility, which underlies the simple static model presented in Section 2. Figure A2 plots the evolution of these two variables at the aggregate level in Korea. It shows that they generally move in opposite directions: since 2010, women's labor supply have been on an upward trend, while the total fertility rate has steadily declined. Note that because we do not observe the counterfactual path in the absence of PL benefit expansions, these time trends alone cannot be interpreted as causal effects of PL policies. In fact, when we incorporate several notable cohort-level changes observed in recent years into the calibrated baseline model, the model implies lower fertility and higher female labor supply, consistent with the patterns shown in Figure A2.

B Details on Micro Data

B.1 Data and Variable Construction

We use data from the Korean Labor and Income Panel Study (KLIPS) to provide empirical evidence in this paper. KLIPS is a longitudinal survey of representative Korean households and individuals, conducted annually since 1998. The survey tracks 5,000 households and their members, offering detailed information on household demographics, education, labor supply, income, expenditure, and fertility. All monetary variables are originally in 2015 KRW, are adjusted for inflation using the Consumer Price Index (2015=100). We first match the individual and household survey data. Household observations are excluded if (1) no matched female member survey exists or (2) one member is an unpaid worker or a business owner with employees. The second condition ensures a focus on subsistence self-employment.

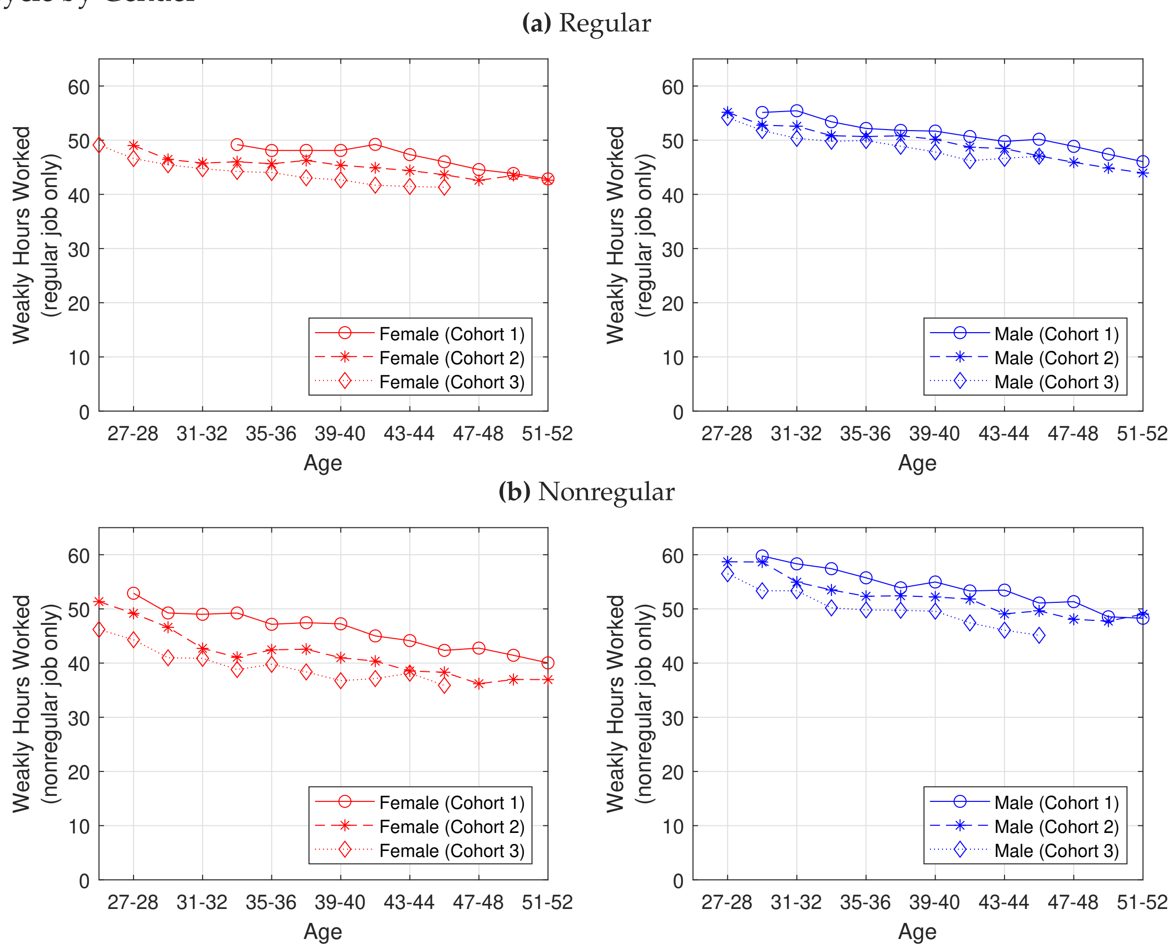
We extract the following variables from KLIPS. From the household-level survey data, we obtain household ID, year, number of (surviving) children, child age, household labor income (annual), financial income (annual), real estate income (annual), and education spending (monthly). From the individual-level survey data, we collect individual ID, year, age (computed from birth year), education status (dropout, enrolled, graduate) across educational levels (elementary, middle, high school, 2-year college, 4-year college, master's, doctorate), weekly hours worked (regular and extra hours), labor income (monthly wage and non-wage compensation), work status (wage worker, business owner, or unpaid family business worker), regular job status, and employer status.

Using the extracted variables, we define household income as the sum of household labor income, financial income, and real estate income. Childcare spending is constructed based on education spending for children aged one or younger, while non-infant education-related spending is based on education spending for children older than one. At the individual level, total hours worked are defined as the sum of regular and extra working hours, and hourly wages are calculated as labor income divided by 4.3 times working hours. Job status is categorized as regular if an individual has a regular job and positive working hours, and nonregular if they do not have a regular job but have positive working hours.

B.2 Empirical Evidence in Section 3

After applying the sample restrictions to the 1998–2021 waves, our final sample includes 1,485 households (female and male parents) in Cohort 1, 1,537 households in Cohort 2, and 1,369 households in Cohort 3. This corresponds to 14,239 total observations for Cohort 1, 14,116 observations for Cohort 2, and 10,773 observations for Cohort 3. To maintain consistency with the two-year model periods, we first average individual variables over two-year intervals before computing cross-sectional averages for the figures in Section 3.

Figure A3: Regular and Nonregular Labor Supply (Intensive Margin) Dynamics over the Life Cycle by Gender

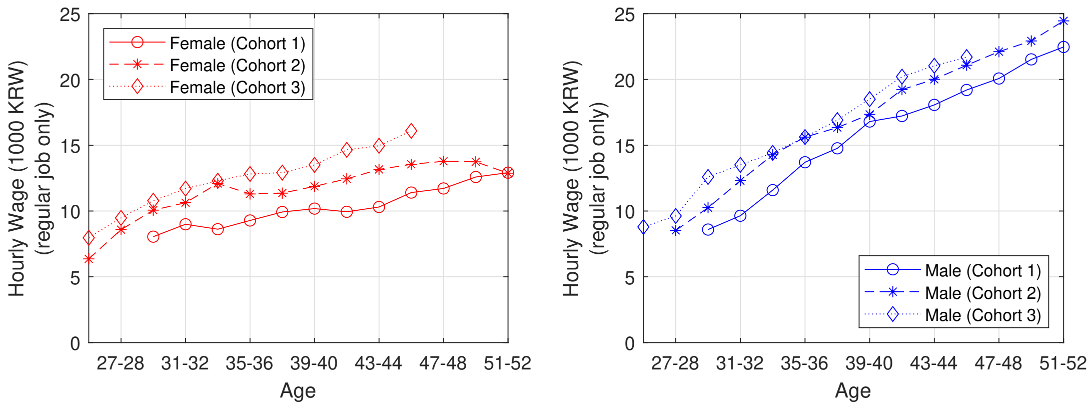


Notes: Labor supply of regular workers or nonregular workers is measured by the average weekly hours worked over two years. Cohort 1: 1965–70, Cohort 2: 1970–75, Cohort 3: 1975–80.

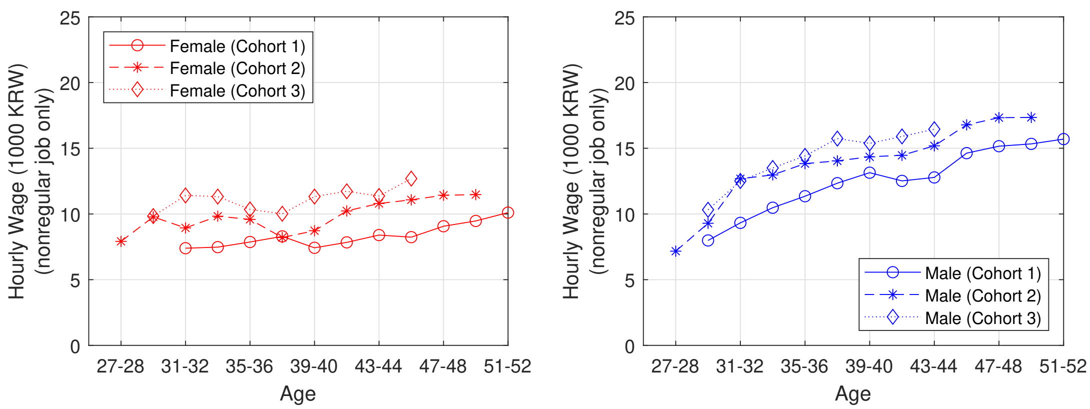
In addition to the figures presented in Section 3, Figure A3 plots labor supply separately for regular and nonregular workers by gender, while Figure A4 shows wages for regular and nonregular workers by gender.

Figure A4: Regular and Nonregular Worker Wage over the Life Cycle by Gender

(a) Wage (Regular Worker Only)



(b) Wage (Nonregular Worker Only)



Notes: Wage is calculated as the average hourly wage in 2012 Korean Won over a two-year period. Cohort 1: 1965–70, Cohort 2: 1970–75, Cohort 3: 1975–80.

B.3 Details on Calibration

The calibration sample consists of households in which the female member was born between 1970 and 1975 (Cohort 2), as defined above. To facilitate consistency with model statistics, we define household (married couple) age solely based on the female's age, unlike in Section 3. For example, when referring to a man's wage at age 30, we mean the wage of a man whose spouse is 30, not necessarily his own age. In line with the two-year model periods, we average individual variables over two-year intervals.[38] The final calibration sample consists of: 1,614 households and 8,616 observations, with biannual observations ranging from 203 to 896 households.

For the consistency with the quantitative model, labor supply moments are computed after constructing average weekly hours worked over two-year periods, catego-

[38] Also, we winsorize the number of children at a maximum of three.

rized into eight non-zero bins to capture variations in work intensity, capturing both intensive and extensive margins. Specifically, $h_g \in \{0, 1, \cdots, 8 = \bar{h}\}$ corresponds to

$$\begin{aligned} \text{avg. weekly hours worked} &= 0 && \text{if } h_g = 0 \\ 9 \times (h_g - 1) < \text{avg. weekly hours worked} &\le 9 \times h_g && \text{if } 1 \le h_g \le 7 \\ 63 < \text{avg. weekly hours worked} & && \text{if } h_g = 8. \end{aligned}$$

Initial Distribution Table A1 reports the distribution of education sorting and fertility patterns, measured among families whose women's age is 25–26. Panel A reports the share of families by education pairing. Panel B shows the distribution of the number of children for each combination of the education groups.

Table A1: Initial Distribution

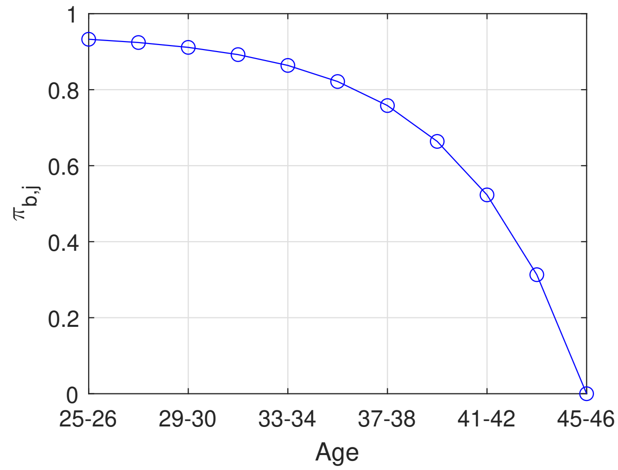
Panel A. Share					
	$e_f =$	1	1	2	2
	$e_m =$	1	2	1	2
Share		36.4%	13.3%	6.7%	43.5%

Panel B. Number of Children					
	$e_f =$	1	1	2	2
	$e_m =$	1	2	1	2
No. of children	0	27.8%	37.5%	42.9%	61.7%
	1	36.1%	53.1%	42.9%	28.3%
	2	35.1%	9.4%	14.3%	10.0%
	3+	1.0%	0.0%	0.0%	0.0%
Average		1.093	0.719	0.714	0.483

Notes: This table presents the initial distribution of education sorting and fertility patterns. $e_g = 1$ denotes noncollege, and $e_g = 2$ denotes college. Panel A reports the share of families by education pairing, while Panel B shows the distribution of the number of children across different education groups.

Fecundity Probabilities To account for this age-dependent fecundity, we adopt the functional form given by equation (18) and choose the parameters by minimizing the distance between the data points reported in Leridon (2004) and the values implied by the function. The resulting parameter values, $\tilde{\pi}_0 = 0.890$ and $\tilde{\pi}_1 = 0.246$, are plotted in Figure A5.

Figure A5: Fecundity by Age Across the Fertile Periods



Social Norms on Infant Childcare We assumed parental time input is a function of nonworking hours with the gender-specific social norm for childcare: equation (7). To calibrate the ratio of parental hours to nonworking hours (λ_g), we use the 2017 KLIPS supplementary data, focusing on households with an infant (age $\leq$ 1). We calculate nonworking hours by subtracting daily working time from a 15-hour time endowment.

Table A2: Social Norms: Parental Hours

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable: Parental hours / nonworking hours					
	Female	Female	Female	Male	Male	Male
Constant	0.496***	0.498***	0.496***	0.198***	0.186***	0.198***
	(0.018)	(0.023)	(0.018)	(0.016)	(0.018)	(0.016)
Education dummies						
$\mathcal{I}_{e_f=0,e_m=0}$		0.052			-0.024	
		(0.058)			(0.041)	
$\mathcal{I}_{e_f=0,e_m=1}$		-0.003			0.069	
		(0.050)			(0.066)	
$\mathcal{I}_{e_f=1,e_m=0}$		-0.055			0.124	
		(0.059)			(0.096)	
Spouse's nonworking time			-0.004			0.006
(De-meaned)			(0.004)			(0.005)
Observations	166	166	166	164	164	164

Notes: *p<0.1, **p<0.05, ***p<0.01. Robust standard errors in parenthesis.

Table A2 provides empirical support for the parameterization of our social norm assumption, λ_g, which the model defines as the ratio of parental hours to nonworking hours (from equation 7). The baseline estimates in Columns (1) and (4) reveal a stark gender disparity. The average ratio for females (λ_f) is 0.496, while the ratio for males (λ_m) is 0.198, showing that the proportion of a mother's nonworking time dedicated to childcare is approximately 2.5 times that of a father's.

The subsequent columns validate our model's parsimonious assumption that this norm, λ_g, depends only on gender and not on other characteristics.

- *Education:* Columns (2) and (5) introduce interaction dummies for spousal education levels. None of the coefficients for these dummies are statistically significant for either females or males. This indicates that the childcare-to-nonworking-time ratio remains stable regardless of the parents' educational pairing.

- *Spouse's Time:* Columns (3) and (6) test the influence of the spouse's available nonworking time. This variable is also highly statistically insignificant. This result is particularly noteworthy: it suggests that an individual's proportional time commitment to childcare does not adjust even when their partner has more (or less) nonworking time available.

Promotion and Demotion Transitions In our model, regular job workers can experience either promotion (an increase in χ) or demotion (a decrease in χ). Empirically, promotion and demotion are determined based on the two-year wage growth, where either a wage increase or decrease exceeding 20% triggers the corresponding event. The probabilities of promotion and demotion vary by gender and age. For female regular workers, the promotion probabilities at $h_g = 5$ are $\Pi^u_{P,f,j\in[1,10]}$ =12.4% and $\Pi^u_{P,f,j\in[11,14]}$ =5.6% for younger and older age groups, respectively, while the corresponding demotion probabilities are $\Pi^d_{P,f,j\in[1,10]}$ =5.4% and $\Pi^u_{P,d,j\in[11,14]}$ =4.1%. These probabilities are higher for male regular workers, with promotion rates of 20.3% and 12.8%, and demotion rates of 6.3% and 5.0% for the two age groups, respectively.

The transition matrix $\pi(\chi'|\chi,(P,P),\mathbf{h})$ is specified according to (25), as discussed in Section 5. We estimate the parameter ζ_P^{motion} through logistic regression on discretized working hours with fixed effects (household by gender by broad age group) as follows. For promotion (u), the regression equation becomes:

$$\text{Prob}(\ln w_{i,g,j+1} - \ln w_{i,g,j} > 0.2|h_{i,g,j}) = \frac{\exp\left(\text{fe}_{i,g,\tilde{j}} + \zeta_P^u h_{i,g,j}\right)}{1+\exp\left(\text{fe}_{i,g,\tilde{j}} + \zeta_P^u h_{i,g,j-1}\right)}, \tag{A1}$$

where i and $\tilde{j}$ index households and broad age groups ($[1,10]$ and $[11,14]$), and $\text{fe}_{i,g,\tilde{j}}$

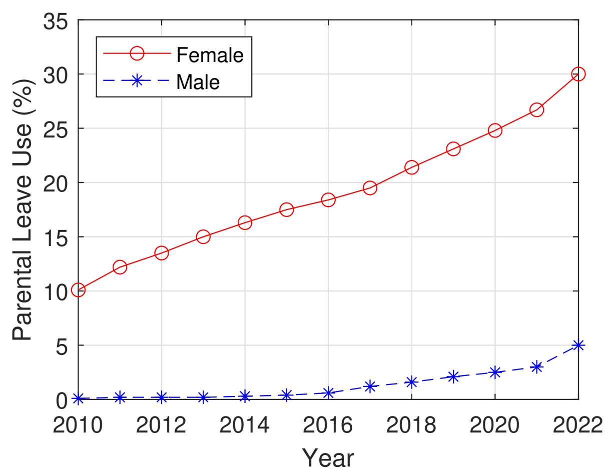
denotes the fixed effects defined above. Similarly, for demotion (d), we have:

$$\text{Prob}(\ln w_{i,g,j+1} - \ln w_{i,g,j} < -0.2 | h_{i,g,j}) = \frac{\exp\left(\text{fe}_{i,g,\tilde{j}} + \zeta_P^d h_{i,g,j-1}\right)}{1 + \exp\left(\text{fe}_{i,g,\tilde{j}} + \zeta_P^d h_{i,g,j-1}\right)}. \tag{A2}$$

The estimated coefficients for ζ_P^u and ζ_P^d from regression equations (A1) and (A2) are 1.230 (0.158) and –1.366 (0.175), respectively, with standard errors in parentheses, clustered at the level of gender by broad age group. The estimated ζ_P^u and ζ_P^d are statistically significant at the 1% level.

Parental Leave Use We collect data on PL use—measured as the number of parental leave takers per 100 births—from the Korean Statistical Information Service (KOSIS). Figure A6 illustrates trends in the share of parental leave use by gender over time.

Figure A6: Parental Leave Use by Gender over Time



C Recursive Problems in Infertile and Old Periods

Table A3: Choices and Household Structures Over Model Periods

	Fertile Periods				Infertile Periods			Old Periods		
Female Age:	25–26	27–28	...	43–44	45–46	...	51–52	53–54	...	79–80
$j =$	1	2	...	10	11	...	14	15	...	28
Consumption-Savings	Yes				Yes			Yes		
Labor-Career Choices	Yes				Yes			No		
New Child (Birth)	Possible				No			No		
Children in Household	Possible				Possible			No		

Infertile periods In infertile periods ($j = 11, \cdots, 14$), fertility is not a choice variable, and children leave the household stochastically. The value of a infertile household is:

$$\bar{V}(a, n, \tilde{\mathbf{s}}, \boldsymbol{\chi}, \tilde{\mathbf{z}}_{-1}, \mathbf{e}, j) = \mathbb{E}_{\xi} \max_{\mathbf{s}} \left\{ \bar{V}_{\mathbf{s}}(a, n, \tilde{\mathbf{s}}, \boldsymbol{\chi}, \tilde{\mathbf{z}}_{-1}, \mathbf{e}, j) - \sum_g \xi_g \mathcal{I}_{\tilde{s}_g = T, s_g = P} \right\}. \tag{A3}$$

The expected value of both working in a regular job before drawing a job-quality shock $\tilde{z}_g$ is

$$\bar{V}_{\mathbf{s}}(a, n, \tilde{\mathbf{s}}, \boldsymbol{\chi}, \tilde{\mathbf{z}}_{-1}, \mathbf{e}, j) = \mathbb{E}_{\tilde{\mathbf{z}}} V_{\mathbf{s}}(a, n, \boldsymbol{\chi}, \tilde{\mathbf{z}}, \mathbf{e}, j). \tag{A4}$$

The value of working s_g job after realization of $\tilde{z}_g$ is

$$V_{\mathbf{s}}(a, n, \tilde{\mathbf{s}}, \boldsymbol{\chi}, \tilde{\mathbf{z}}_{-1}, \mathbf{e}, j) = \max_{\substack{c, a', x_q \geq 0 \\ h_g \in \mathbb{H}_{s_g}}} \left\{ \begin{array}{l} u(c/\Lambda(n)) + \phi(n, x_q^{\alpha}) - v(\mathbf{h}, \mathbf{e}, s_f, n, b, j) - d(\mathbf{l}) \\ + \beta \mathbb{E}_{\boldsymbol{\chi}' | (\boldsymbol{\chi}, \mathbf{s}), \tilde{\mathbf{s}}} \bar{V}(a', n', \tilde{\mathbf{s}}', \boldsymbol{\chi}', \tilde{\mathbf{z}}, \mathbf{e}, j+1) \end{array} \right\} \tag{A5}$$

subject to

$$c + x_q n + a' = \sum_g w_g h_g + (1+r)a - \mathcal{T}(\mathbf{h}, a, \mathbf{w}) \tag{A6}$$

$$w_g = \omega_{e,j} \gamma_{\chi_g} \tilde{z}_g (1 + \tilde{\omega}_{P,g} \mathcal{I}_{s_g = P})(1 - \mathcal{I}_{g=f} \varsigma), \quad g = f, m \tag{A7}$$

$$n' \sim B(n, p_n), \tag{A8}$$

where $B(n, p_n)$ denotes a binomial distribution. In other words, each child leaves the household with probability $1 - p_n$, so the total number of children in the household in the next period follows a binomial process: $n' \sim B(n, p_n)$.

Old Periods The household optimization problem simplifies during the old periods, specifically for $j = 15, ..., 28$, as there is no endogenous labor supply and no children in the household. The value functions in these periods can be expressed as:

$$R(a, \boldsymbol{\chi}, \mathbf{e}, j) = \max_{c, a' \geq 0} \{u(c/\Lambda(0)) + \beta R(a', \boldsymbol{\chi}, \mathbf{e}, j+1)\}$$

subject to

$$c + a' = \sum_g \mathcal{P}(\chi_g, e_g) + [1 + (1 - \tilde{\tau}_k)r]a,$$

where $\mathcal{P}(\chi_g, e_g) = \vartheta \times \tilde{\omega}_0 \exp(\tilde{\omega}_1(15-1))(1+\tilde{\gamma})^{(\chi_g - 1)}(1 + \tilde{\omega}_e \mathcal{I}_{e_g=2})$ represents old-age income, which is assumed to be proportional to final working-age income, depending on education and career stage, with a scaling parameter ϑ.

D Parental Leave Policy Reforms in Korea

The PL policy in Korea dates back to 1988, when the Equal Employment Act granted female workers eligibility for unpaid leave for up to one year. In 1995, the Labor Standards Act allowed male workers to take leave only as a substitute for mothers. It was not until 2001 that both mothers and fathers were allowed to take leave, with a small flat monetary benefit introduced at a modest level (approximately 200K KRW per month). Benefit amounts gradually increased over time, reaching 300K KRW in 2002, 400K KRW in 2004, and 500K KRW in 2007.

Maternity leave has existed for decades, first introduced in 1953 under the Labor Standards Act, with a maximum duration of 60 days. In 2001, the same act extended the duration to 90 days, with a 100% replacement rate, subject to a cap of 1,350K KRW for the final month. Paternity leave was introduced in 2008 under the Equal Employment Act, initially allowing a maximum of three days, which was later extended to 10 days in 2019.

In 2011, PL benefits transitioned from a flat-rate system to a wage-dependent structure, covering 40% of the worker's salary. The benefit was capped at approximately 2.5 times the prior flat rate, with a minimum of 500K KRW and a maximum of 1,000K KRW per month (Kim et al., 2023). In 2017, PL benefits became more generous. The replacement rate was sharply increased to 80% for the first three months and 50% for the remainder of the leave period. Moreover, the benefit cap rose by 50% to 1,500K

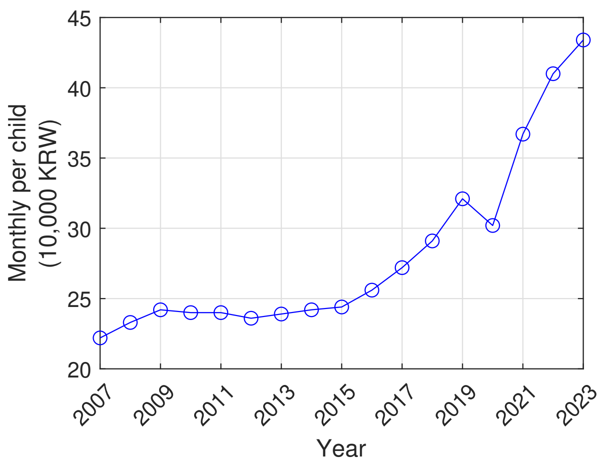
KRW, while the minimum increased by 40% to 700K KRW. In 2020, both mothers and fathers in Korea became eligible to take PL simultaneously; prior to this change, parents were required to take leave sequentially without overlap.

In 2022, PL benefits were further expanded, with new benefit amounts set at a minimum of 700K KRW and a maximum of 1,500K KRW per month, while maintaining the replacement rates. Adjusting for a 2% average annual inflation rate, these amounts are equivalent to 583K KRW and 1,250K KRW in baseline terms. Compared to the baseline value of 400K KRW, the 2022 Reform increased the minimum benefit by 50% and the maximum benefit by 210%. Additionally, the maternity leave cap for the third month was raised to 2,000K KRW, representing a 20% increase from the baseline. Notably, the 3+3 program was introduced to encourage joint PL usage in response to low take-up rates among fathers. Under this program, the replacement rate increases to 100% when both parents take PL for three months, either simultaneously or sequentially within a year of birth, and the benefit cap was significantly raised to 3,000K KRW per parent, approximately 6.3 times the baseline amount after inflation adjustment. These form the basis for the policy parameter choices in the *2022 Reform* discussed and analyzed in Section 6.

Despite these expansions, ongoing policy debates suggest that the benefit cap remains insufficient. A recent reform, scheduled for implementation in 2025, will introduce a more generous but gradually diminishing cap structure, with a cap of 2,500K KRW and 2,000K KRW in the first and second quarters, respectively, and 1,600K KRW from the third quarter onward. The policy parameter choices in the *2025 Reform* in Section 6 are based on these changes. In practice, the government also considered other programs that are not incorporated in our analysis to maintain a focused scope. These include the expansion of the 3+3 program, aimed at increasing fathers' PL uptake further, and an extension of the maximum leave duration to 1.5 years.

E Supplementary Tables and Figures for Counterfactual Exercises

Figure A7: Recent Change in Private Education Expenditure



Source: Private Education Expenditures Survey, Statistics Korea

Table A4: Effects of PL Reforms on Hours: Intensive and Extensive Margins

	Intensive Margin						**Extensive Margin**					
	Female (by j)			Male (by j)			Female (by j)			Male (by j)		
	1-5	6-10	11-14	1-5	6-10	11-14	1-5	6-10	11-14	1-5	6-10	11-14
Baseline	5.71	5.65	5.19	6.13	5.89	5.72	0.35	0.39	0.51	0.82	0.69	0.53
Experiments												
	% change relative to the baseline											
2022 reform	*-3.5*	*-0.7*	*0.0*	*-0.1*	*0.0*	*0.1*	*4.0*	*1.9*	*0.1*	*-1.3*	*-0.6*	*-0.4*
2025 reform	*-3.6*	*-1.3*	*0.0*	*-0.4*	*0.0*	*0.0*	*4.5*	*2.4*	*0.2*	*-1.2*	*-0.8*	*-0.3*

E.1 Inducing Father's PL Use

In this subsection, we examine a component of policy reforms designed to promote joint PL usage: the *3+3 program*. To assess whether this program effectively fosters more egalitarian PL use, we compare this incentive-based approach with a counterfactual

Table A5: Parental Leave Job Protection and Labor Market Segmentation: Heterogeneous Effects

	Lifetime Labor Supply (max: 1)								Completed Fertility			
	Female				Male							
$e_f =$	1	1	2	2	1	1	2	2	1	1	2	2
$e_m =$	1	2	1	2	1	2	1	2	1	2	1	2
Baseline												
Benchmark	0.33	0.18	0.44	0.26	0.55	0.59	0.37	0.48	1.86	1.86	1.75	1.74
Alternative PL structure / labor market												
w/o protection	0.33	0.18	0.44	0.26	0.54	0.59	0.37	0.48	1.85	1.86	1.70	1.72
w/o segment.	0.40	0.27	0.44	0.32	0.51	0.53	0.42	0.45	2.41	2.03	2.25	2.00

Experiments: 2025 reform

	% change relative to the corresponding baseline											
Benchmark	*1.2*	*0.9*	*0.5*	*0.1*	*-1.6*	*-0.9*	*-3.9*	*-0.1*	*6.5*	*1.8*	*24.3*	*10.5*
Alternative PL structure / labor market												
w/o protection	*1.2*	*0.4*	*1.9*	*4.9*	*-1.6*	*-0.9*	*-4.3*	*-5.1*	*3.6*	*0.4*	*12.9*	*-1.0*
w/o segment.	*-1.6*	*-2.2*	*-2.0*	*-3.3*	*-1.6*	*-1.0*	*-8.8*	*-2.7*	*6.1*	*2.3*	*11.5*	*1.1*

Notes: "w/o protection" indicates that PL use is not counted as working period and therefore does not reduce the minimum required working period for regular jobs ($\underline{h}_P \leq h_g$, not $\underline{h}_P \leq h_g + l_g$). "w/o segment." refers to the absence of entry barriers for regular jobs, i.e., zero entry cost for regular job positions ($\xi_g = 0$). Lifetime labor supply is calculated as the sum of total labor supply over the lifetime, divided by the maximum possible labor supply. $e_g = 1$ denotes noncollege-educated, and $e_g = 2$ denotes college-educated. Italicized numbers indicate the effects of PL reforms, expressed as percentage changes relative to the corresponding baseline economy.

policy that mandates joint PL use. Our model, which endogenizes both partners' decisions, is well suited for conducting this experiment. Specifically, we evaluate the marginal contribution of the *3+3 program* within the 2025 Reform by comparing the policy effects of the full reform to a modified version that removes only the *3+3 program*. In the joint-use mandate scenario, we replace the *3+3 program* with a requirement that PL can be used only if both spouses take at least one quarter of leave.[39] This counterfactual reflects a more rigid, prescriptive approach to promoting gender-equal PL participation and fertility. We also consider a case in which fathers are exogenously assumed not to use any PL.

Table A6 summarizes the results. It first highlights the importance of endogenizing fathers' PL choices in our benchmark model. In the "w/o male PL" scenario, fathers' PL use is fixed at the pre-reform level (0%). In this case, the 2025 reform's positive fertility effect is dampened, rising by 7.5% instead of 8.6% in the benchmark. This 1.1

[39] We assume that one quarter of maternity leave is exempt from this mandate.

Table A6: Father's Parental Leave Use

	Labor Supply							Parental Leave			
	Female (by j)			Male (by j)			**Fertility**	Users (%)		Length(>0)	
	1-5	6-10	11-14	1-5	6-10	11-14	**Rate**	Female	Male	Female	Male
Baseline	2.01	2.19	2.67	5.01	4.06	3.02	1.80	6.3	0.0	2.4	n/a
Experiments: 2025 reform											
	% change relative to the baseline										
Benchmark	*0.8*	*1.1*	*0.2*	*-1.5*	*-0.8*	*-0.3*	*8.6*	28.0	4.8	4.5	4.0
Alternative PL policy											
w/o male PL	*3.0*	*2.5*	*0.9*	*-2.2*	*-2.0*	*-1.3*	*7.5*	29.0	0.0	4.5	n/a
w/o 3+3	*0.8*	*1.1*	*0.2*	*-1.5*	*-0.8*	*-0.3*	*8.5*	27.9	4.4	4.5	4.0
Joint mandate	*0.3*	*0.3*	*0.4*	*0.1*	*0.1*	*0.5*	*-0.8*	7.4	0.7	1.4	3.5

Notes: In "w/o male PL", male workers cannot use PL. "3+3" refers to the *3+3 program*, which incentivizes joint PL use by temporarily increasing the cap and replacement rate. "Joint mandate" requires both spouses to take PL for at least one quarter if either spouse wishes to use it. Italicized numbers indicate the effects of PL reforms, expressed as percentage changes relative to the corresponding baseline economy.

percentage point difference is attributable to fathers' use of PL. Moreover, the model without male PL overstates the reform's impact on narrowing the gender labor supply gap: female labor supply in the early childrearing years increases by 3.0% in the "w/o male PL" case, compared with only 0.8% in the benchmark.

Next, the "Benchmark" and "w/o 3+3" scenarios show the marginal effect of the joint-use incentive program. We find that the *3+3 program* is modestly effective: it nudges slightly more fathers to take leave, increasing the share of male users from 4.4% to 4.8%. This is accompanied by a very small additional fertility gain—a rise of 8.6% compared with 8.5% without the incentive.

In sharp contrast, the "Joint mandate" policy produces markedly different outcomes. This rigid requirement, which replaces the incentive with a condition for eligibility, substantially weakens the policy's intended effects. The mandate is restrictive enough that it overturns the fertility gains, leading to a 0.8% decline relative to the baseline. Although PL use (7.4% for women and 0.7% for men) is slightly higher than in the original baseline, it remains far below the levels generated by the 2025 "Benchmark" reform (28.0% for women and 4.8% for men).[40] These results highlight why a mandated joint-use policy is ineffective: rather than increasing co-participation, the mandate substantially reduces overall PL use by imposing a stringent coordination requirement.

[40]Note that one quarter of maternity leave is exempt from the mandate, which explains why the share of female PL users remains higher than that of fathers under the joint mandate.